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## EDITORIAL

# Medico Legal Aspect of Strike by Doctors

Strike as a means of protest is given as a fundamental right recognized in most of the democratic countries including India. Although, strike in healthcare sector causes great inconvenience to common man, especially who are in need of immediate healthcare due to danger of loss of life or limb. But due to insensitivity of political leaders doctors are left with no option, but to resort to popular method of protest, i.e. strike.

Strikes are not uncommon in health care sector. Very often doctors, nurses and other staff of the hospital resort to strike, when the management or the authorities concerned do not fulfill their demands. In March 2012, nurses employed in various major private hospitals in south including Apollo, Fortis and Madras Medical Mission Hospital resorted to strike for 7 days demanding hike in their basic salary besides other benefits. As per an RTI, resident doctors in a government hospital in Delhi went on strike five times from 2006 to 2011. ESMA was invoked twice in this period. In Kerala, nurses in hospitals continued their strikes for 115 days.

### DEFINITION OF STRIKE

As per section 2(q) of Industrial Dispute Act 1947, strike means cessation of work/suspension of work/or work stoppage by a body of persons employed in any industry acting in combination, or a concerted refusal under a common understanding of any number of persons who are or have been so employed to continue to work or accept employment with a view to persuade, force, or coerce their employer to accept the terms of condition of employment.

### COMMON REASONS FOR STRIKE BY DOCTORS

Any industrial dispute, however minor, may sometimes lead to strike if the dispute is not addressed expeditiously or the management is insensitive to the point of view of the staff. Generally the reasons as under leads to strike:

- Dissatisfaction with Government/Hospital Policy
- Salary, increment and incentive problem
- Wrongful discharge or dismissal of employees

- Withdrawal of any concession or privileges
- Hours of works or rest intervals
- Leave with wages or holidays
- Bonus, profit sharing, Provident Funding & Gratuity
- Retrenchment of workers and closure of establishment
- Disputes connected with minimum wages
- Violence by patient and their attendants
- Inadequate budget for healthcare leading to lack of infrastructure and equipments and their maintenance

### LEGAL OR ILLEGAL STRIKE

The right to strike in Indian constitution set up is not absolutely right but it flows from the fundamental right to form union. As every other fundamental right is subjected to reasonable restrictions, the same is also the case to form trade unions to give a call to the workers to go on strike and the state can impose reasonable restrictions.

Under the Industrial Dispute Act 1947, the ground and condition are laid down for the legal strike and if those provisions and conditions were not fulfilled then the strike would be illegal. Sections 22 and 23 of the Act lay down **Prohibition of strikes** as follows:

- a) Without giving to the employer notice of strike, as herein-after provided, within six weeks before striking; or
- b) Within fourteen days of giving such notice; or
- c) Before the expiry of the date of strike specified in any such notice as aforesaid; or
- d) During the pendency of any conciliation proceedings before a conciliation officer and seven days after conclusion of such proceedings

Contravention of these conditions makes the strike or lockout illegal. Delhi Government has banned strikes in all government hospitals saying that they were against public interest. Divisional bench headed by **Hon Chief Justice M K Sharma** said that strikes by doctors both in central and state government were illegal. Banning strikes would ensure patient's fundamental right to life. Court

has also ruled that doctors, residents, interns, para medical staff or any other person of AIIMS can no longer go on strikes including protests and demonstrations.

In Medical Code of Ethics and Regulations, 2002 by Medical Council of India, which is binding on all doctors also strongly prohibits any doctor's strike especially of emergency services. Doctors cannot refuse treatment to any patient who is in **need of emergency care**.

### **NEED FOR ACTION PLAN FOR HANDLING A STRIKE IN HOSPITAL**

As already stated earlier, strikes in hospitals are not uncommon though it is generally presumed that hospital workers are not as union minded as other industrial workers because of the environment under which they operate. When a strike in any hospital starts, initially, it may involve a particular section of employees but other staff members may join in support of the striking employees if the demand made appear to be justified and show solidarity with fellow employees. This has to be kept in mind while making any strategy. A well thought out plan prepared in advance will maintain service's effectiveness.

### **STRATEGY FOR PREVENTION OF STRIKE**

#### **Need to Open All Channels of Communication:**

Employees should feel free to communicate so that any dissatisfaction or discord can be nipped in the bud. Complaint arising from any section should not be brushed aside and must be addressed appropriately and promptly.

#### **Regular Electronic Surveillance:**

- Through the CCTV covering the entire premises to monitor any usual or untoward incidence.

#### **Regular rounds by the Security Officer:**

- To detect any untoward activity and to keep a watch on the activity within the establishment.
- One patient and one attendant norm to be implemented.
- Display of gate passes by the attendants to be made compulsory to deny access to any unsocial elements in the hospital premises.

### **STRATEGY FOR MANAGEMENT PLAN TO DEAL WITH STRIKE IF PREVENTIVE PLAN FAILS:**

- On receipt of the strike notice, all concerned departments such as Labour Department, Ministry of

Health, Local Government (Municipal Corporations, Development Authorities, etc.), Head Quarters and senior officers should be immediately apprised of the situation of the concerned organizations etc. The ready list of all such officials including the formats of report or letters must be available for prompt action.

- Officials for internal coordination must be detailed by name.
- Mechanism for regular update must be in place.
- Management should get involved in negotiations with the representatives of the striking employees. If required top management gets involved so that decisions taken can be implemented.
- All efforts must be made to resolve the conflict. All communication channels must be reinforced.

### **PATIENT CARE PLAN**

The most important part of the strategy is to deal with strike related to patient care, which involves following steps:

- Patient census, particularly patients in high dependency areas like ICU, casualty and other critical areas and bed bound patients.
- Patient evacuation plans in case required. Reduction in the number of the patients and name of the hospitals where patients will be evacuated. The details of staff to be contacted in such contingency.
- **OPD Policy:** whether restricted OPD or attend only emergency patients need to be defined in policy document itself.

#### **Policy for surgical patients:**

- Planned surgery to be postponed.
- Identify facilities where patient's referral/transfer will be done. Closest hospital must be identified and agreement between the two hospitals must be in place in advance.

### **HUMAN RESOURCE PLAN AND STRATEGY**

- Identify staff by name that will be overall responsible for all coordination and operations.
- Name and title of the staff which will be on duty during the strike,
- Staffing details for all the three shifts of the staff not on strike.
- Contingency plan for recruiting new staff in case is expected for a longer duration. Support plan of staff from other facility.
- Training and development plan for the new staff.



- Available staff may be given multiple responsibilities besides their own job. Orient the staffs before making them do such task.
- Deployment of senior professionals on duty in case junior doctors is on strike.
- Senior nursing staff, including administrative-nursing staff to be detailed in case of strikes by junior nursing staff.

### **Security Contingency Plan**

- Special security arrangement to ensure safety of patients, attendants, staff not participating in strike.
- Facility safety, which includes building, equipment and all other assets of the establishment.
- Keep local police in loop. Police personnel to be available within the premises.
- Name of officers responsible and the emergency telephone numbers of the departments like fire, water, gas, ambulance, electricity, telephones etc.
- Ensure safe access to the staff willing duty as striking employee may stop them from entering the premises. This may happen far away from the premises.

### **Logistic Plan**

Plan for at least one week's stock of pharmaceuticals and other medical supplies, linen and laundry, fuel and gas, food and beverages supply and review the same on further developments. Aim should be to maintain essential services without disrupting the patient care services. All basic support services should remain functional.

## **THE ESSENTIAL SERVICES MAINTENANCE ACT (ESMA), 1981**

The ESMA provides for the maintenance of certain essential services and normal life of the community and extends to the whole of India. Section 2 of the Act gives the details of services included in essential services, including hospitals or dispensaries. The Act defines strike as the cessation of work by a body of persons while employed in any essential service acting in combination or concerted refusal or a refusal under a common understanding of any number of persons who are or have been so employed to continue to work or to accept work assigned, and includes:

- Refusal to work overtime where such work is necessary for the maintenance of any essential service.
- Any other conduct which is likely to result in, or results in cessation or substantial retardation of work in any essential service.

## **POWER TO PROHIBIT STRIKES IN CERTAIN EMPLOYMENTS**

If the Central Government or appropriate authority is satisfied that in the public interest it is necessary or expedient to do so, it may, by general or special order, prohibit strikes in any essential service specified in the order. It can also prohibit lockout and layoff if considered necessary. An order made under sub-section (1) of the Act shall be in force for six months only which can be further extended for another period not exceeding six months, if it is satisfied that in the public interest it is necessary or expedient to do so.

### **Upon the issue of an Order**

- No person employed in any essential service to which the order relates shall go or remain on strike.
- Any strike declared or commenced whether before or after the issue of the order by the persons employed in any such service shall be illegal.

### **Disciplinary action for participating/instigating an illegal strike**

Any person who commences or instigates or takes part in a strike, which is illegal, shall be liable to disciplinary action including dismissal. He or she can be arrested without a warrant and awarded imprisonment for a period extending from 6 months to one year.

## **SUMMARY AND CONCLUSIONS**

The right to protest is a fundamental right of each individual including doctors enshrined in the Indian Constitution. However, the right to strike is only conditional available only when certain pre conditions are fulfilled. Even the appropriate government is authorized to prohibit a strike or its continuance when essential services are affected. The strikes in health care sector are not uncommon being reported from time to time in various parts of India. Any strike in a hospital may severely affect patient care services or even loss of life. An organization needs to develop a strategic plan in advance to handle strikes so that services are not unduly affected.

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## REVIEW PAPER

# Nam Technique: An Overview

*Roy Bhabotosh Kumar<sup>1</sup>, Bora Neelutpal<sup>2</sup>, Bharali Trailokya<sup>3</sup>*

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## ABSTRACT

*Presurgical infant orthopaedics have been employed since 1950 as an adjunctive neonatal therapy for the correction of cleft lip and palate. Most of these therapies did not address deformity of the nasal cartilage in unilateral and bilateral cleft lip and palate as well as the deficiency of the columella tissue in infants with bilateral cleft. The nasolaveolar molding (NAM) technique a new approach to presurgical infant orthopedics developed by Grayson reduces the severity of the initial cleft alveolar and nasal deformity. This enables the surgeon and the patient to enjoy the benefits associated with repair of a cleft deformity that is minimal in severity. This article describes a clinical case report appliance design, clinical management and biomechanical principles of nasolaveolar molding therapy.*

**Keywords:** Cleft lip and palate, nasolaveolar molding, presurgical orthopaedics

## INTRODUCTION

Nasoalveolar molding (NAM) is a tissue-expansion procedure performed by dentists prior to a surgical repair for cleft lip and palate.<sup>1</sup> The NAM technique allows the pediatric dentist and surgeon to mold the abnormally formed nasal cartilage into a more optimal relationship prior to surgery.<sup>2</sup> The carefully controlled tissue expansion created by the NAM allows for the creation of a more normal appearing nose at the time of surgery for the lip closure than compared to traditional treatment by secondary alveolar bone grafting.

Creating a symmetrical nose from the deficient columella and deformed nasal cartilage in cleft patients is a great challenge. The lower lateral alar cartilage in patients with unilateral cleft lip and palate is depressed and concave in the alar rim. It separates from the non cleft-side lateral alar cartilage, resulting in depression and displacement of the nasal tip. The columella is shorter on the cleft side and is inclined over the cleft with the base deviated towards the non-cleft side.

Presurgical nasal molding has also been introduced as an adjunctive neonatal management for preoperative correction of nasal deformities by utilizing the malleability of alar cartilage shortly after birth. Grayson et al. proposed the combination of presurgical orthopaedics and nasal moulding as a new technique called presurgical nasoalveolar molding for approximating the alveolar cleft and improving the nasal deformities preoperatively.<sup>3</sup>

## SURGERY ALONE

Cleft lip and palate often leave the middle part of the nose and the nasal cartilage deformed. Surgery alone is often not enough to provide an aesthetically acceptable

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correction. The NAM technique takes advantage of the malleability of immature cartilage of the nose and the ability to non-surgically construct the columella (middle part of the nose) through the application of tissue expansion. By the addition of a nasal portion to the moulding plate, we can often correct the nasal tip, the base on the affected side, as well as the position of the philtrum and columella.<sup>4</sup>

## TIMING OF TREATMENT

It has been well researched that there is a temporary *plasticity* of the nasal cartilage and alveolar process in the early weeks of the neonatal period. It is believed to be caused by high levels of hyaluronic acid, a component of the proteoglycan intercellular matrix, found circulating in the infant for the first few months after birth. The ideal time to begin NAM is 1-2 weeks after birth. The combination of nasal and alveolar presurgical infant orthopaedic molding (nasopalveolar molding) has resulted in measurable long-term benefits to the patient and in medical economics.<sup>4,5,6,7,8</sup>

## ADVANTAGES

- Improved feeding, growth guidance
- Development of palatal segments
- Minimization of treatment at a later age
- Normalization of tongue position
- Resulting in better speech
- Positive psychological effect on the parents
- Improved long-term nasal esthetics
- Reduced number of nasal surgical procedures
- Reduced need for secondary alveolar bone grafts in the majority of patients if gingivoperiosteoplasty is included in the protocol
- Savings in cost

## IMPRESSION PROCEDURES

Impression procedures in cleft infants pose a unique set of challenges in infants including the size constraints imposed by the infant's oral cavity, anatomical variations associated with the severity of clefts and a lack of ability of the infant to cooperate and respond to commands. All infant impressions are taken in the neonatal intensive care unit with a surgeon present at all times to avoid complications and to handle airway emergencies.

The quality of a cleft lip and palate impression depends on two factors- complete inclusions of the lateral maxillary

segments with a good reproduction of the muco-buccal fold and adequate extension of the impression into the cleft area. The impression must extend into the nasal chamber and every available undercut. It is these undercuts that provide retention capability of the appliance. Parents are instructed not to feed the infant for at least two hours prior to the procedure. High volume suction is also ready, at all times, in case regurgitation of the stomach contents occurs during the procedure. The impression is made when the infant is fully awake without any anesthesia or premedication. Infants should be able to cry during the impression procedure and absence of crying may be indicative of airway blockage. The parent sits on a stool of adjustable height. The infant is made to lie in a supine position on the lap of the parent with the head on the knee at a lower level. The clinician positions himself in a comfortable 10 o'clock position to the infant's head. A wax sheet of approximate size and shape is adapted intraorally using the thumb and index finger. Impression compound is also used for impressions of infants with oral clefts (**Figure 1**). The advantages of its use are, it can be removed before it sets in case of any emergency and it has excellent resistance to tearing. A wax spacer is adapted on the stone model on which a custom acrylic tray with a handle is prepared (**Figure 2**).<sup>9</sup>



**Figure 1** Impression compound



**Figure 2** Acrylic tray

The tray is smoothened and polished to avoid rough areas. Pea-sized amounts of fast setting elastomeric putty material are kneaded together taking care to use more catalyst to accelerate setting loaded into the custom tray



and impressions obtained with the infant, parent and operator in the same position, as mentioned earlier. Elastomeric putty impression materials,<sup>9</sup> unlike alginate does not extrude deep into undercut areas in the region of the cleft. This helps during removal as it resists tearing and, as a result, removal is atraumatic to the infant. Additionally, in a laboratory setting the material remains dimensionally stable and permits accurate pouring of multiple casts. After the tray is removed the oral cavity is inspected for any loose fragments of impression material.

A molding plate is then fabricated and inserted. The infant will wear the molding plate 24 hours a day for approximately 4-6 months. The molding plate causes no pain and is attached with small rubber bands taped to the face (**Figure 3**).

Adjustments to the molding plate/nasal portion are done weekly, or every other week, depending on the progress. Each adjustment is very small, but it starts to guide the baby's gums, lip, and nasal cavities as they are growing.



**Figure 3** Molding Plate with rubber band and nasal stent

At the conclusion of nasoalveolar molding (in unilateral cases, it is approximately four months and in bilateral cases, six months), the nasal cartilages, columella, philtrum, and alveolar segments should be aligned to facilitate the surgical restoration of a child's facial features to normal configurations.

### TREATMENT DETAIL

The NAM technique uses an acrylic appliance to approximate the cleft and mold the nose, reducing the amount of surgical correction required.

### TREATMENT GOALS

To restore the correct skeletal, cartilaginous, and soft tissue relationship pre-surgically

- To align and approximate the intraoral alveolar segments (greater/lesser segments)
- To correct the malposition of the nasal cartilages
- To correct the nasal tip and the alar base on the affected side(s), as well as the position of the philtrum and columella.<sup>4,10,11</sup>

### NEED FOR TREATMENT PRIOR TO 6 WEEKS OF AGE

At birth there is a high level of hyaluronic acid in the infant, which begins to fall off after 6 weeks of age. The presence of hyaluronic acid in the body makes molding the tissue and bone more easy. This facilitates the:

- Active reduction of the cleft parts
- Enlargement of the affected nostril (alar)
- Lengthening the area under the nose tip (columella)
- Lengthening of the skin under the nose to the upper lip (philtrum)
- Bringing the upper lip segments together

When these facial areas are restored to a more normal size and position the following surgical connection of these cleft parts is vastly more normal in appearance.

### TREATMENT PROTOCOL

#### Evaluation

Within the first 1-2 weeks after birth, an interdisciplinary cleft palate team evaluates the infant. A clinical examination is completed to determine whether or not the infant is a good candidate for NAM treatment. A full upper arch dental impression is taken to capture the intraoral cleft defect, using a soft putty-type material in an infant-sized acrylic impression tray. A nasal impression is made to aid in the fabrication of a nasal stent and for comparison of the pre- and post-nasoalveolar molding results (**Figure 4**).



**Figure 4** Nasal Stent

### Treatment Stage One: Leveling and Aligning of the Alveolar Segments

One week after the molding plate with button is delivered it is adjusted for ulceration or pressure sores. Every 2 weeks thereafter, the plate is adjusted. Soft lining acrylic is added on one side and the hard acrylic is removed on the opposite side, actively moving the alveolar segments 2-3 mm/visit. Cheek taping exerts an upward and backward force on the molding plate via orthodontic elastic bands; lip tape compresses the lip segments together (**Figure 5**).



**Figure 5** Taping of the acrylic plate

The alveolar cleft is closed to less than 3-4 mm, to attain a better anatomical base, resulting in improved nasal support prior to placement of the nasal stent.

### Treatment Stage Two: Implementation of the Nasal Stent (Figure 3)

- At this stage, the nose is molded to support the nasal tip and create tissue-expanding forces.
- It is modified at each visit to impart convexity to the alar cartilages.
- The total treatment time for unilateral cleft cases is 2-3 months.
- Bilateral clefts are more complicated and take somewhat longer.

### CONTRAINDICATIONS FOR TREATMENT

- Severe systemic deficiencies
- Risk of airway obstruction
- Age of infant
- Parental compliance

### NASOALVEOLAR MOLDING TEAM

The cleft palate team consists of surgeons, pediatric dentists, orthodontists, prosthodontists, psychologists, therapists, translators, geneticists, and for some of our

older patients, even make-up artists.<sup>1,2,4,5,6,7,10,12</sup>

### BILATERAL CLEFT LIP AND PALATE

The bilateral cleft lip and palate (**Figure 7**) deformity presents additional challenges for satisfactory surgical repair. The usual surgical approach to the correction of bilateral cleft lip necessitates a two-stage surgical repair of the short or absent columella and the excessively wide prolabium. Presurgical columella elongation combined with orthopedic retraction of the premaxilla and active alveolar molding has eliminated the need for the traditional surgical reconstruction of the columella. In the method of nasoalveolar molding and columella elongation, the posterior lateral alveolar ridges are molded to an appropriate width to accept the premaxilla. Using the molding plate in conjunction with external tape and elastics retracts the premaxilla. Bilateral nasal stents are extended into the nostril aperture from the vestibular flange of the intraoral molding plate. A band of soft acrylic presses against the naso-labial fold. The combined effects of pushing the nasal tip forward and pressing back on the naso-labial fold results in gradual tissue expansion and lengthening of the columella. At the same time, the domes of the lower lateral nasal cartilages are brought together in the midline, and the intranasal lining is expanded. A surgical correction of the nose is necessary to remove the fibro adipose tissue that is deposited between the widely separated nasal dome cartilages. The lip repair uses a straight-line approach on either side. Bilateral gingivoperiosteoplasties are performed if alveolar segments are touching at the time of surgery. Narrowing of the alar bases is greatly facilitated by preoperative premaxillary retraction. The combination of presurgical nasoalveolar molding and nonsurgical columella elongation allows bilateral cleft lip and nose correction in a single stage. This has been shown to result in an improved aesthetic outcome and reduced need for surgical revision before the age of secondary bone grafting.

### RESEARCH STUDIES

Maull 1999 reported the long-term retention of nasal symmetry achieved by presurgical nasoalveolar molding. Presurgical nasoalveolar molding was shown to significantly increase symmetry of the nose. This increase in symmetry was maintained into early childhood. Gingivoperiosteoplasty has been shown to eliminate the need for secondary alveolar bone grafting in 60% of cases treated with presurgical orthopedics. The combined

benefits of presurgical nasoalveolar molding and gingivoperiosteoplasty have been shown to reduce the overall cost of therapy from birth to adolescence. In contrast to earlier forms of infant orthopedics, unilateral nasoalveolar molding is concluded by 3 to 4 months of age, and bilateral nasoalveolar molding is usually completed by 5 months. In both unilateral and bilateral treatment, the molding plate is not used after surgery.

It is important to recognize that state of the art gingivoperiosteoplasty changed in significant ways from its introduction by Skoog 1967 to the more current method of Millard and Latham. The Skoog technique required extensive sub periosteal dissection to achieve soft tissue closure of large alveolar cleft gaps. Orthopedic alveolar molding to close the gap and bring the cleft alveolar segments into passive contact precedes the current practice of gingivoperiosteoplasty. The strict association of presurgical nasoalveolar molding and alveolar gap closure allows gingivoperiosteoplasty to be performed, confining sub periosteal dissection only to the cleft edges. It is unlikely that the conservative neonatal gingivoperiosteoplasty would place this group at any additional risk of growth disturbance in the remaining years of growth when compared with the conventionally treated cleft population, all of whom should have undergone secondary bone grafting by the age of 10 years.

The nasoalveolar orthopedic plate was used in newborns with complete unilateral cleft of the lip and palate, to correct osseous as well as soft tissue deformities.<sup>13,14,15,16,17,18,19,20</sup>

## CONCLUSION

Long-term studies on NAM therapy indicate better lip and nasal form, reduced oro-nasal fistula and labial deformities, 60 % reduction in the need for secondary alveolar bone grafting. No effect on growth of midface in sagittal and vertical plane has been recorded up to the age of 18 yrs. With proper training and clinical skills NAM has demonstrated tremendous benefit to the cleft patients as well as to the surgeon performing the repair.

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## OBITUARY



**Birth : 23 April, 1955**  
**Death : 26 October, 2015**

**His wife received the life time achievement award at ICFMT conference at Gurgaon**

**Prof. Abhininder Singh Thind** has studied MBBS at Galancy Medical College, Amritsar and has worked at Govt Medical College Patiala as Professor and Head of Forensic Medicine. He was a very affectionate and loving colleague and received several award. Indian Congress of Forensic Medicine and Toxicology (ICFMT) conference held at Gurgaon in 2015 November has decided an oration in his memory form next conference onwards. Life time achievement award was given posthumously at ICFMT conference, 2015. He was also a member of International Advisory Board of IJHRMLP. We condoled his death and prayed to his highness that his soul rest in peace.



REVIEW PAPER

# Embalming: The Art of Preserving the Dead

**Paul Biswadeep<sup>1</sup>, Patowary AJ<sup>2</sup>**

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## ABSTRACT

*Embalming is a process by which dead bodies are preserved by adding various chemicals that delay the putrefactive process. It has been practised since time immemorial by ancient Egyptians, the Peruvian Incas, the Hans Dynasty of China, during American Civil War to the modern day. In 1867, the German chemist August Wilhelm von Hofmann (1818 - 1892) and Alexander Butlerov (1817 - 1868) were credited with the discovery of formaldehyde whose preservative properties were soon discovered and subsequently became the foundation for modern methods of embalming, replacing previous methods and materials based on alcohol and arsenical salts. Legal requirements of practice vary geographically. In many places, embalming is not done by trained embalmers, but by doctors who while have the required anatomical knowledge, are not trained specialists in this field. Today, embalming is a common practice in North America and New Zealand while it is somewhat less frequent in Europe. In some countries, permits or licences are required; in others it is performed only by medical practitioners. The procedures applied may also vary depending upon expertise and environmental requirements.*

**Keywords:** *Embalming, history, materials, procedures*

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## INTRODUCTION

Embalming is the art and science (treatment) of preserving the dead body with antiseptics and preservatives to forestall decomposition.<sup>1</sup>(*embalm-em-balm(m-bäm)tr.v. em-balmed, em-balm-ing, em-balms*). Embalming is the word for the old English phrase “to apply balm” and is derived from the Latin word “*emencapsulate*” and “*balming*” or “*balsam*”- any aromatic resin produced by certain trees of the mint family. The purpose is to keep them suitable for public display at funerals, for religious reasons, for medical, scientific and academic purposes such as their use as anatomical specimens. The basic goals of embalming are sanitization, presentation and preservation (or restoration). Embalming is distinct from taxidermy as embalming preserves the human body intact, whereas taxidermy recreates an animal, using only the creature’s skin mounted on an anatomical form.<sup>1</sup>

## HISTORY

In classical antiquity, the Egyptian culture had developed embalming to the greatest extent, as early as the first dynasty (3200 BC), specialized priests were in charge of embalming and mummification.<sup>1</sup>The Mummy of Tutankhamun discovered on 12<sup>th</sup> Feb, 1924 by English Egyptologist Howard Carter in tomb KV62 bears testimony to the ancient practice.<sup>2</sup> According to Herodotus of 450 BC, the Macrobian of ancient Egypt, who inhabited parts of the Horn of Africa, practised an elaborate form of embalming by preserving the bodies of the dead during the 1<sup>st</sup> millennium BC.<sup>1</sup>

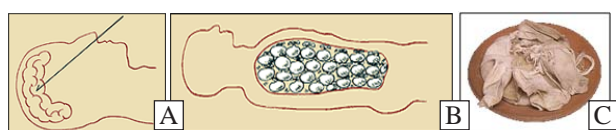
Embalming in Europe became common in the industrialized regions especially during the Crusades in parallel with the Anatomists of the Renaissance. The period of the Middle Ages and the Renaissance are known as

the *Anatomists period of embalming*. It reached its peak during the British Empire and American Civil War, a period starting from 1861 known as the *Funeral period of embalming*. Embalming his first corpse in 1861, Dr. Thomas Holmes, the father of modern as well as American embalming, developed a technique that involved the draining of a corpse's blood and embalming it with a fluid made with arsenic for preservation and in the process performed over 4000 embalmings during the war.<sup>1,3</sup> In 1867, the German chemist August Wilhelm von Hofmann (1818-1892) and Alexander Butlerov (1817-1868) discovered formaldehyde which became the foundation for modern methods of embalming, replacing previous methods and materials based on alcohol and arsenical salts.<sup>1</sup>

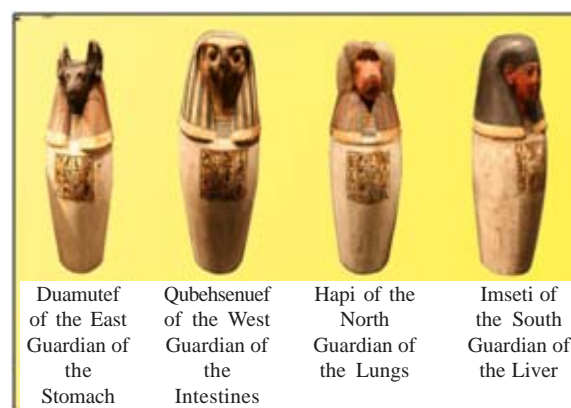
### EGYPTIAN PROTOCOLS

The Egyptians embalmed for religious reasons to help the dead enter the afterlife, because of the belief that in afterlife the decedent required a body. The protocol maintained was more or same along the entire Nile Valley;<sup>1,4</sup>

- The embalming process took about 70 days.
- The body was first taken to the tent known as '*ibu*' or the '*place of purification*', and washed with good-smelling palm wine and rinsed with water from the Nile.
- An incision was made into the left side and the internal viscera except heart and brain were removed and placed in stone *canopic jars*.<sup>5</sup> Being centres of feeling and intelligence respectively, they were thought to be required in afterlife.
- The brain, accessed via the nose, was minced and pulled from the skull with hooks.
- The body cavity was next stuffed with natron salt (a naturally occurring mixture of sodium carbonate and bicarbonate in varying proportions and obtained from the dry alkaline lake beds or shores), the skull filled with resin, and then allowed to "cure" for a period of about 40 days.
- After that the body was again washed with Nile water, anointed with perfume and oil and packed with herbs, linen, and/or sawdust.
- Finally, the body was wrapped in linen and placed in a coffin for entombment.<sup>1,4</sup>



**Figure 1** (A) Mincing of the Brain, (B) Body cavity stuffed with natron salts and (C) Linen wrappers.<sup>1</sup>



**Figure 2** Canopic jars<sup>6</sup>



**Figure 3** Embalming process inside anibu<sup>7</sup>

### Arsenic Embalming

From the Civil War until about 1910, arsenic was the main ingredient in embalming fluids along with creosote or mercury. Much less complicated and less time consuming than the Egyptian method and the basis for modern embalming, arsenic mixed with water was injected through the arterial system. Arsenic embalming began as a sanitary practice and a practical means to preserve the body until burial or for transport. Although effective, arsenic is toxic and persistent, and elemental arsenic never degrades into harmless by-products. Consequently in the early 1900s, arsenic use was banned from embalming due to the concern for health of embalming practitioners and interference with autopsies after embalming had occurred.<sup>1,8</sup>

### Modern Embalming and its development

Embalming by arterial injection was developed in the first half of the 17th century by the noted English physiologist William Harvey. The first attempts to inject the vascular system were made by Alessandro Giliani of Persiceto.<sup>1</sup> Jean Gannal (1791-1882) became the first to



offer embalming to the French general public. The American Civil War (1861-1865) was the turning point in breaking down public resistance to “mutilating” the body and in establishing arterial embalming as a common practice in the United States where embalmers experimented with a wide combination of arsenic, mercury, creosote, turpentine and various forms of alcohol.<sup>3</sup>

### Religious practices

There is a difference of opinion amongst different faiths as to the permissibility of embalming. Most branches of the Christian faith, members of Iglesia ni Cristogenerally allow embalming whereas some Neopagans, members of the Bahai Faith, Zoroastrians, Jews and Muslims discourage embalming, believing it to be unnatural to disrupt the physical recycling of the body to the Earth owing to the false notion that embalmed bodies do not decompose.<sup>1</sup>

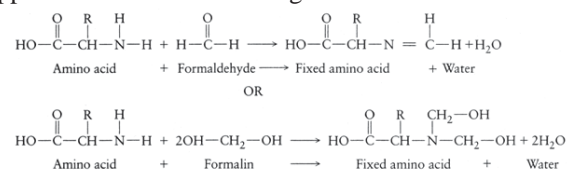
### Embalming protocols

Embalming fluid contains a mixture of formaldehyde, glutaraldehyde, methanol and other solvents. The formaldehyde content ranges from 5-35 % and the ethanol content may range from 9-56 %. Other agents used are sodium citrate (about 1kg), NaCl (about 0.75kg), glycerine (about ½ litre) and Na-Borate (about ½ litre).<sup>9</sup> The formaldehyde content in arterial fluids is measured by index which is the total percentage of formaldehyde gas in the fluid. Fluids with an index of 5-15 are considered to be low firming fluids; 16-24 produces medium firming and 25 and above highly firms the tissue. It is often necessary to perform embalming within 6-12 hours of death in summer and 24-48 hours in winter.<sup>4</sup> The embalmer must inject about 1 gallon of fluid for every 50 pounds of body weight, i.e., a 70kg body would require fluid equivalent to 10 litres. A typical gallon of fluid is made up of 1 bottle of arterial fluid, 1 bottle of co-injection fluid, 1 bottle of water corrective and enough water to complete the gallon which changes depending on the condition of the body.<sup>1</sup> Formaldehyde is extremely toxic and IARC (*International Agency for Research on Cancer*) classifies it as a Class I carcinogen. OSHA (*Occupational Safety and Health Administration*) regulates its use in funeral homes.<sup>10,11</sup>

### How it works

Embalming fluid acts to fix (denature) cellular proteins, which no longer acts as a nutrient source for bacteria and

also kills the bacteria. Diffusion occurs into the cells and tissues for preservation at the capillary level. Formaldehyde fixes tissue or cells by irreversibly connecting a primary amine group in a protein molecule with nearby nitrogen in a protein or DNA molecule through a -CH<sub>2</sub>- linkage called a Schiff base. Via colour changes, the end result also creates the simulation of the appearance of blood flowing under the skin.<sup>1,12</sup>



### Five steps of embalming procedure

When death occurs and authorization is granted by the family, doctor, and/or by the medical examiner, the embalmer is called upon to carry out the process which involves mainly five steps:<sup>13,14,15</sup>

1. **Pre-embalming:** An embalming report is filled out that logs all personal belongings, discolourations and injury details and documents the procedures and chemicals used during embalming; followed by loosening of Rigor Mortis, removal of bandages, catheter/cannula, shaving of face etc.
2. **Feature setting:** Resetting of facial features and the body itself is done before arterial embalming. The eyes are either clogged with bit of cotton or fitted with eye-caps to hide shrunken eyeballs. The mouth is closed either by tying the jaw together with a piece of suture string or by a special injector gun. A small amount of stay cream is also used on the mouth to avoid dehydration and hold the lips in place.
3. **Arterial embalming:** In arterial embalming, the fluid composed of preservatives, germicides, anticoagulants, dyes and perfume is pushed into an artery while the blood is drained from a nearby vein or from the heart (**Table 1**). The right side of the body near the collarbone is preferred to access the right common carotid artery<sup>14</sup> and the right internal jugular vein. Commonly a solitary location known as a single-point injection or single-pointer is used whereas in cases of poor circulation additional injection points (axillary, brachial or femoral arteries<sup>14</sup>, with occasional ulnar, radial and tibial vessels) are used. An injection utilizing both the left and right carotids is specifically referred to as a *restricted cervical injection (RCI)*,

while draining from a different site to injection is referred to as a *split/cut injection*.

The embalming machine regulates pressure (the force of the fluid) and rate of flow (speed of the fluid) to create the optimum rate of injection for the body either with continuous or alternating pressure in sync with period of drainage. Drainage can also be achieved by keeping the vein open using angle forceps which allows clots and blockages to flush out more easily. Pre-injection chemicals used break up clots and condition vessels while co-injection chemicals restore dehydrated tissues, fight oedema (too much fluid in the tissues), and correct hard water. Dyes used in arterial fluids, back flow of the arterial fluid and firming of the tissues provide hint to the extent of penetration.

4. **Cavity embalming:** Arterial fluids mainly treat the skin, muscles and organ parenchyma, as such organ contents such as urine, bile, etc. begin to decompose. Gases and bacteria pent up, causing distension and purgation out of the external orifices. As such cavity embalming becomes a necessity.

Fluids of the internal organs are aspirated by the use of a trocar<sup>15</sup> connected to a device that creates suction (electric aspirator or water powered aspirator (hydro-aspirator)). It is inserted near the belly button (two inches superior and two inches to the right) and gases and fluids are withdrawn before 2 bottles of full strength fluid are injected and subsequently drained to treat the entire thoracic and abdominal cavities. Post autopsy the organs are dissected out and incinerated or are treated with chemicals, stuffed back and the hole is closed with trocar button. Cavity fluids are slightly more acidic than arterial fluids and hence produce firmer tissues in a faster time (**Table 2**).

5. **Post embalming:** The body and hair are washed and then thoroughly dried and combed, restorations are done, makeup is applied and fingernails are trimmed by a professional. The body is dressed in an outfit and placed into the casket for display. Some embalmers utilize hypodermic bleaching agents, such as phenol based cauterants, during injection to lighten discoloration and allow for easier cosmetizing or apply methylated spirit to negate foul smell.

## Other methods

*Hypodermic embalming* is a supplemental method for injection of embalming chemicals into tissue with a hypodermic needle and syringe, which is used as required to treat areas where arterial fluid has not been successfully distributed during the main arterial injection.<sup>1</sup>

*Surface embalming* utilises embalming chemicals to preserve and restore areas directly on the skin's surface and other superficial areas of damage such as from accident, decomposition, cancerous growth or skin donation.<sup>1</sup>

**Table 1** Composition of embalming fluids<sup>16</sup>

Ingredients	Proportion
Formalin ( <i>preservative</i> )	1.5 litres
Sodium borate ( <i>buffer</i> )	600 g
Sodium citrate ( <i>anticoagulant</i> )	900 g
Glycerine ( <i>wetting agent</i> )	600 g
Sodium chloride ( <i>controls pH</i> )	800 g
Eosin 1% ( <i>cosmetic</i> )	30 ml
Soluble wintergreen ( <i>perfume</i> )	90 ml
Water ( <i>medium</i> )	Up to 10 litres

**Table 2** Composition of cavity embalming fluid<sup>16</sup>

Ingredients	Proportion
Formalin	60%
Methanol ( <i>preservative</i> )	25%
Liquefied phenol ( <i>germicide</i> )	10%
Sodium lauryl sulphate	1%
Mercuric chloride	1%
Eucalyptus oil	1%

## Types of injectors

Various types of injectors are used in modern embalming to carry out the process in a more effective way. Some commonly used are:<sup>16</sup>

1. **Hand/ foot pump**
2. **Stirrup pump**
3. **Bulb syringe**
4. **Gravity injector:** It is the simplest, safest and slowest method.
5. **Motorized injectors:** About 10 liters of arterial fluid is injected in 30 minutes and pressure maintained is about 2kg/sq cm.<sup>16</sup>

## Methods of injection and drainage

1. **Continuous injection and drainage:** Both arterial injection and venous drainage are done

simultaneously. The process saves time but is least satisfactory.

2. **Continuous injection with disrupted drainage:** Arterial flow is maintained continuously but venous drainage is done discontinuously when pressure increases.
3. **Alternate injection and drainage:** The process of injection and drainage is done alternately.
4. **Discontinuous injection and drainage:** It is considered the best method. It consists of injection at 2 hours interval for 2-3 times followed by drainage little before and after injection.<sup>16</sup>

### Legal formalities

Embalming in India is performed by medical experts/ doctors only for academic, transportation, repatriation, display or any other legal purpose. Legal requirements over practice of embalming vary geographically; while some regions or countries have no specific requirements at all. The Federal Trade Commission in America as part of "The Funeral Rule" has spelled out several important guidelines to govern funeral directors and embalmers in the practice of embalming. According to "The Funeral Rule":<sup>1</sup>

- i. **Law of the land:** The Funeral Director must be forthright in disclosing the fact that embalming is not a legal requirement as Federal Law does not require embalming under any circumstances and unusual circumstances may crop up due to local or state guidelines and must be for a particular reason.
- ii. **Consent:** The family of the deceased or the person planning the funeral has to give consent for the body to be embalmed which must be expressly stated and cannot be simply implied; as merely agreeing to the funeral does not mean expressed consent to embalming.<sup>1,4,17</sup>
- iii. **Notifiable diseases and conditions:** The chain of custodians of the deceased has to be notified about the infectious status at every level.
- iv. **Fees, expenses and receipts:** According to these legal guidelines, a funeral director may charge the grieving family a fee for embalming and state clearly the legal requirement on an itemized bill only when authorities or the law (either state or local) permits it for some special reason.

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REVIEW PAPER

# Role of Nutrition in Orthodontics: A Review

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## ABSTRACT

*Nutrition plays an important role in the development of dental and related structures from the fetal stage to maturation. The importance of diet and nutrition has been recognized in health and disease for ages. More so, the history of mankind has been to a large extent a struggle to obtain food. With the recognition of proteins, carbohydrates and fats as energy yielding foods and the discovery of vitamins and minerals, great advances have been made in the knowledge of nutrition and its practical application. Proper nutritional status of the orthodontic patient is important, since success is dependent on the response of skeletal, dental and soft tissues for the accomplishment of the desired results. In this review article, we will discuss about some of the important factors essential in the growth and development of the jaws, which has an influencing effect on orthodontic treatment of a patient.*

**Keywords:** Diet, nutrition, orthodontics

## INTRODUCTION

Adequate nutrition is important for proper body growth, its development and maintenance. Nutritional imbalances affect the normal growth and development of the individual directly or indirectly. Deficiencies resulting during the formative stages of an organ results in a more severe and irreversible damage, which follows the general rule that earlier the deficiency greater is the damage. Poor nutrition reduces the resistance of the tissues to infections and increases the length of healing period after surgery or an injury.

The proper nutritional status of the patient is of utmost importance in orthodontic treatment, since success depends on the response of bone to stimulation and reformation for the accomplishment of desired results. Only when we begin to understand these vital nutrients and the role-played by each one in the normal development of orofacial region and the body as a whole can we realize its relevance in clinical application. This will facilitate a comprehensive approach to orthodontic treatment as a whole.

## NUTRITION IN GROWTH AND DEVELOPMENT

Nutrition plays a vital role in the growth and development of an individual. Development is a process, which commences at conception and continues through birth until death. The perceptible visible evidences of developmental changes are growth.

Guilford<sup>1</sup> in 1874 was amongst the first to advocate dietary deficiencies as an underlying cause of dentofacial irregularities. Important relationship exists between diet and development, which can be seen during the nutrition of the foetus; placenta is the provider of the essential

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nutrient substrates and fetal tissue synthesizes its own proteins and nucleic acids. Therefore, interferences with substrate availability results in decreased protein metabolic activity.

Although Cohen<sup>2</sup> suggested that some human dental deformities may be the result of allergy but Pottenger<sup>3</sup> has shown that allergic manifestations and dental disturbances comparable to those seen in human beings result from changes in food preparation.

Miller<sup>4</sup> suggested that “critical periods” exist during the development of an organ and that stress imposed by the nutritional imbalance during critical periods can result in irreversible changes. Critical periods are defined as that time in the development of an organ system, which is marked, by the rapid synthesis and accretion of protein. The critical period roughly equates with the intense hyperplastic growth phase. If imbalance occurs during hyperplastic phase then it causes irreversible damage to the tissues. If it occurs during hypertrophic phase then the growth may stop temporarily but will catch up later when adequate amounts of missing nutrients become available. Dietary deficiencies of essential nutrients during the critical periods of growth have caused retardation of growth and morphologic alterations of the orofacial area in both humans and animals.<sup>5</sup>

Malnutrition has been associated with shorter mandibles in the anteroposterior dimension, marked reduction in the ascending ramus, condylar region and the setting of the premolars; dentoalveolar inclination in the incisor region and reduction in the mesio-distal dimension of the third molars.

## EFFECT ON BONES

It is important to point out that a growing bone is different from a matured bone in its response to the environment. Any nutritional deficiency occurring during the active growth can be disastrous. Vitamin A deficiency, which frequently accompanies protein calorie malnutrition, may result in inadequate bone growth patterns with concomitant misalignment and malocclusion of the teeth. An excess of vitamin A during the critical growth period markedly inhibits the neural crest cell development and upsets the normal balance between bone formation and resorption. Increased Vitamin A also causes softening of the skull due to decrease in calcium deposition.

Calcium, Vitamin D and phosphorus are essential for the

formation of bones and teeth. Deficiencies of these nutrients cause retarded jaw, teeth and condyle development.

Deficiency of Vitamin D causes rickets, maxillary dysplasia, and susceptibility to muscular traction. Facial sutures close with difficulty leading to open bite, transverse hypo dimension and misshapen palate.<sup>2, 3, 11, 12, 13</sup>

## Cleft lip and palate

World's most common birth defect is the cleft lip and cleft palate (1 in 900 births). A variety of nutrient deprivation or excess as well as teratogenic agents can produce a very high incidence of this congenital anomaly, as palatal tissues are very susceptible to environmental changes (**Figure 1**).

During palatal development a number of macromolecules increase during the critical stages of palatal fusion like glycoprotein, enzymes, actin and mucopolysaccharides. If these are not supplied in the required amounts due to nutritional deficiency then will lead to the anomaly. Studies suggest that an excess of vitamin A during this phase may lead to cleft palate formation.<sup>2,3,6</sup>



**Figure 1** Unilateral CLCP patient

Singh and Chawla conducted a study on the contribution of diet in malocclusion in north Indian population. They stated that occasional or no consumption of coarse and fibrous food had a positive influence on the incidence of class II div 1 and skeletal type of malocclusions.<sup>6</sup>

The diets of rural populations, which usually contain an abundance of raw vegetables, offer adequate muscular stimulation and hence suffer from orthodontic problems. It thus appears that these changes to softer food caused unfavorable changes in muscle tone and a tendency for skeletal and dental problems to develop.

## EFFECTS OF NUTRITION ON TEETH AND SALIVARY GLANDS

Teeth and salivary glands enter into hypertrophic and hyperplastic growth phases, critical periods do exist in the development of the teeth, salivary glands during which time and imposed stress (nutritional imbalance) will lead to irreversible changes in these tissues. Therefore a variety of amino acids, vitamin A, D and C, calcium and phosphorus must be present to ensure optimal calcification during the teeth formation and calcifying periods.

Fluorides do not cross the placental barrier in sufficient amounts to provide optimal incorporation into tooth enamel crystal and therefore strengthen the tooth against carious challenge. Deficiency of essential nutrients results in the following effects on teeth.

Hypoplasia is due to defective formation of the organic matrix during the formative stage. Hypocalcification is due to defective mineralization of the organic matrix (**Figure 2, 3**). Other defects include: abnormal shapes, sizes and location of teeth, e.g., peg laterals, increased susceptibility to caries due to poor calcification of teeth resulting in enamel solubility.



**Figure 2** Enamel Hypocalcification



**Figure 3** Enamel defects

## DIET

Diet affects teeth in 2 distinct ways. One is the local

effect and depends on the intra oral chemical or physical action on the external surfaces of the teeth. The other is the systemic nutritional factor, which is important during the period of tooth development.

## Effects of carbohydrates, proteins and fats on dental caries:

### CARBOHYDRATES

They have been demonstrated to be important etiologic agents in dental caries. Immediately following the bathing of the teeth with carbohydrates there is a drop in pH of the plaque, the return of the tooth plaque to its original base line pH is rather slow, about an hour. This drop in pH is indicative of acid production and most investigators conclude that bacterially produced acids are a major factor in the production of incipient carious lesions. Carbohydrates associated with formation of dental caries must:

- Be present in the diet in meaningful quantities.
- Be cleared slowly or ingested frequently.
- Be readily fermented by cariogenic bacteria.

### PROTEINS

Although it is a well known fact that carnivorous animals rarely develop tooth decay and that persons ingesting high protein diet have no particular susceptibility to dental caries, it is too early to assess the importance of this finding in terms of dental caries etiology. However, it does point out to the possibility that under certain conditions modifications of the constituent's dietary proteins may affect caries initiation.

### FATS

Dietary fats have a limited influence on dental caries. Experiments with animals suggest that the inhibition mechanism is a local one, very possibly associated with an oil film on the tooth surface, thus altering the surface properties of the enamel and possible interference with the metabolism of oral micro organisms.

### DEMINERALIZATION

A common concern in orthodontics is the potential development of decalcification, caries and periodontal problems. These problems can be associated with bonds or bands when combined with an improper diet involving unregulated sugar consumption and inadequate oral hygiene.



The relationship between dental caries and the ingestion of fermentable carbohydrates has been known for a long time. Many foods contain substances called buffers that neutralize any acids formed for, e.g., Calcium from milk or protein from meat can neutralize or absorb acids.

### **NUTRITIONAL INFLUENCE ON PERIODONTIUM**

Majority of the research findings on the effects of nutrition on oral and periodontal tissues point to the following:

1. There are nutritional deficiencies that produce changes in the oral cavity; these changes include alterations of the lips, oral mucosa, bone as well as the periodontal tissues.
2. There are no nutritional deficiencies that cause gingivitis or periodontal pocket.

There are however, nutritional deficiencies that can aggravate the injurious effects of the local irritants on the periodontium.

#### ***Physical character of diet***

Soft diet leads to plaque and calculus formation whereas hard and fibrous food provide surface cleansing action and stimulation, which leads to decreased plaque and gingivitis.

Chewing of fibrous foods doesn't increase gingival keratinisation as believed, but it produces a type of oral muscular activity or physiotherapy that can have a beneficial stimulatory effect on strengthening the periodontal ligament and increasing the density of the alveolar bone.<sup>7, 8, 9</sup>

#### ***Effect of vitamin deficiency on periodontium***

1. **Vitamin A** deficiency leads to keratinizing metaplasia of the epithelium, increased susceptibility to infection and disturbances in bone growth, shape and texture. Animal experiments suggest that vitamin A deficiency may predispose to periodontal disease.
2. **Vitamin B** deficiency leads to gingivitis, glossitis and glossodynia, angular cheilitis and inflammation of the oral mucosa. Folic acid deficient animals present necrosis of the gingival, periodontal ligament and alveolar bone without inflammation. The absence of inflammation is the result of deficiency-induced granulocytopenia.
3. **Vitamin C** deficiency leads to scurvy. It has been suggested that ascorbic acid may play a role in

periodontal disease by one of the following mechanisms:

- a) Low levels of ascorbic acid influence the metabolism of collagen within the periodontium, thereby affecting the ability of the tissue to regenerate and repair itself.
- b) Vitamin C deficiency interferes with bone formation and remodeling of the periodontal bone
- c) Its deficiency may aggravate the gingival response to plaque and worsen the edema, enlargement and bleeding

Mc Canlies et al studied the effect of vitamin C on the mobility of pig incisors under orthodontic forces and observed increased osteoclastic activity and large resorption lacunae in pigs with decreased or no vitamin C in diet.<sup>15</sup>

4. **Vitamin D** is essential for the absorption of calcium, for the maintenance of Ca and PO<sub>4</sub> balance and for the formation of teeth and bones. Its deficiency is characterized by the osteoporosis of alveolar bone and cemental resorption.

#### ***Effect of Orthodontic treatment on nutrient intake***

Diet can affect the periodontal health, oral microbial composition; wound healing, protein synthesis, growth and I.Q. But when a person is undergoing orthodontic treatment, his or her dietary requirements and habits change which should be kept in mind before commencing the treatment.

The diet of adolescent patients becomes more important because moving teeth creates an increased nutrient demand. Physical, physiological and emotional stresses caused by orthodontic treatment sets in motion hormonal reactions that increase nutrient mobilization and utilization. This raises the nutritional requirement of the patient. Maintenance of diet is especially important to prevent infection, promote growth and development and allow the healing of periodontal tissues during treatment.

Giordan (1997) studied the effect of orthodontic treatment on nutritional intake of the patient and concluded that there was a significant decrease in the fibre content of diet and higher fat and low carbohydrate soft food consumption.<sup>9</sup>

Strause and Saltzmann<sup>10</sup> also concluded that there was a decrease in the Mn and Cu intakes during orthodontic treatment, which may lead to decreased bone remodeling.

**NUTRITIONAL CONSIDERATION IN ORTHODONTIC TOOTH MOVEMENT**

Tooth movement involves biologic responses to orthodontic forces, which may be influenced by ascorbic acid. 17-72% of orthodontic patients are deficient in Vitamin C. Lack of Vitamin C interferes with collagen synthesis thus affecting both periodontal ligament and the formation of osteoid. Animal studies have shown that Vitamin C deficiency causes enlarged endosteal spaces with osteoclasts, uneven periosteal surfaces with osteoclastic activity.<sup>12, 13, 14, 15,16</sup>

Vitamin C deficiency also affects the stability of orthodontic correction, i.e., it affects retention. This has been confirmed from experiments on guinea pig incisors, where the Vitamin C deficient group experienced more relapse.

**CONCLUSION**

The oral cavity and the contiguous structures of the craniofacial complex provide an excellent barometer for the patient's health status. However, since orthodontists are mechanically oriented it is difficult to maintain a biologic perspective and to continue to think in terms of the biologic process. Therefore, the need arises for the orthodontist to contribute towards a holistic approach of treatment becoming conscious of the patient as a whole. The main objective of orthodontist should not only include esthetic harmony.

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REVIEW PAPER

## Euthanasia: Should it be Legalised? Current Scenario in India

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### ABSTRACT

*Euthanasia, a highly debated term was first used by Seutonius and was introduced in the medical field by Francis Bacon. Worldwide arguments are going on its various issues which gradually turned into euthanasia movement and have taken its pace in 20<sup>th</sup> century. Anne Hall was a major figure in euthanasia movement in USA, who organised an extensive letter writing campaign and also a debate on annual meeting of American Humane Association in 1905, which was the first landmark public debate following which America saw the first attempt to legalise euthanasia in 1906, but bill was not passed. After long continued debate, it was legalised in Netherlands, Belgium, Switzerland, Luxemburg, Washington and Oregon with strict guidelines, but was banned in Michigan. In India, euthanasia is not legalised till date. On 7<sup>th</sup> March, 2011 Supreme Court has given directive as a part of judgement in relation to appeal for euthanasia of Aruna Sarbhang, considering legal aspect which will be law until parliament passes bill legalising it. We need clear cut rules which should be ethically permissible and legally defendable keeping the patients best interest in mind.*

**Keywords:** Euthanasia, Indian scenario, right to life, legalisation

### INTRODUCTION

With easy accessibility of health care facilities, now we get many patients with terminal illness getting admitted into hospitals with the hope that their diseases are curable. But, even with the advancement of medical science many diseases are incurable till today. After realising this fact, towards the end of futile effort, being exhausted by sufferings many patients or their family members approach the treating physicians for dignified end of their life. We, clinicians are the first person to face this problem and also have to play an important role in the whole process. We need clear cut rules which should be ethically permissible and legally defendable. So, we should take prime responsibility to create awareness amongst public for generation of opinion regarding legalisation of euthanasia keeping the patient's best interest in mind.

### REVIEW

Euthanasia the most widely debated and rarely accepted term was first used by great historian Seutonius to describe the death desired by king Augustus<sup>1</sup>, and was introduced in the medical field by Francis Bacon<sup>2</sup> in the 17<sup>th</sup> century to describe easy, peaceful and painless death. Since then, arguments are going on worldwide raising issues in relation to ethical, moral, religious, civil rights and legal issues.

Since its introduction in medical field attempt has been taken to define it clearly for benefit of patients. The definition should include painless and quick death to lessen the suffering of patients without any personal gain. It incorporates all necessary condition, with "the painless killing of a patient suffering from an incurable

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and painful disease or in irreversible coma”<sup>3</sup> and “a deliberate intervention undertaken with the expressed intention of ending a life, to relieve intractable suffering”.<sup>4</sup> Motive a crucial part of arguments for euthanasia, is incorporated in this definition but it did not specify about consent, another important aspect to be considered. In Netherlands, euthanasia is understood as “termination of life by a doctor at the request of a patient” and the law clearly states that patient should be the consenting authority.<sup>5</sup> In a discussion of euthanasia presented in 2003 by the European Association of Palliative Care (EPAC) Ethics Task Force<sup>6</sup> the authors offered: “Medicalised killing of a person without the person’s consent, whether non voluntary or involuntary is not euthanasia: it is murder. Hence, euthanasia can be voluntary only.”

Euthanasia is classified in three categories depending upon informed consent<sup>7</sup> Voluntary-when patient himself gives the consent, non voluntary –where consent is given by a surrogate person because the person is unable to ask for euthanasia or to make a meaningful choice between living and dying and involuntary euthanasia conducted against the will of the patient.<sup>8</sup> Euthanasia can be further divided into passive or active variants.<sup>9</sup> Passive euthanasia entails the withholding of common treatments. Active euthanasia entails the use of lethal substances or forces, such as administering a lethal injection to kill. Another terminology used in this context is physician assisted suicide in which a person himself administers the lethal drug.

In USA, the euthanasia movement had taken its pace in the 20<sup>th</sup> century. Anna Hall saw the sufferings of her mother while battling with liver cancer and had decided that others wouldn’t have to endure the same sufferings and organised an extensive letter writing campaign and also organised a debate on annual meeting of American Humane Association in 1905, which was the first landmark public debate following which America saw the first attempt to legalise euthanasia in 1906 at General Assembly of Ohio by Henry Hunt<sup>10</sup> but, bill was not passed. The Voluntary Euthanasia Society known as Exit, formed in 1935 in the UK was the first publicly acknowledged euthanasia society in the world, which organized a campaign for the legalization of euthanasia. The next year, a bill to legalize euthanasia was debated in the House of Lords in the UK, but it was rejected.<sup>11</sup> The debate continued extensively till the first court case in Netherlands in 1973, following which several important

cases appeared before court necessitating the need for legalisation.

Many terminally ill patients are getting admitted into hospitals with the expectation that diseases are treatable which in reality are not. Now, the question is, is it justifiable to keep a person alive suffering from an agonising painful incurable disease which will definitely cause untimely death? In permanent vegetative state is it reasonable to prolong the life? If a patient expressed a wish not to have life sustaining treatment in futile cases or in PVS should it be respected? If such request comes from family members can it be considered? Emotional sufferings of near and dear ones can it be ignored? Can the family bear the cost of LST which is very costly? These questions were argued before giving judgements in different landmark cases and the court decisions and directive on them became the cornerstones in the development of euthanasia act around the world.

Public opinion for legalization of euthanasia and physician-assisted suicide has been increasing over time. In the USA, in 1950, only 34% of citizens agreed that physicians should be allowed to hasten the lives of patients with incurable diseases. By 1991, the figure increased to 63%.<sup>12</sup> In Michigan, 66% supported PAS, 25% wanted a ban on it.<sup>13</sup> In another study conducted on oncology patients and public, two third of them supported euthanasia and PAS.<sup>14</sup>

Clinicians face this problem before an appeal is made before court and also has to play an important role in the process. So their opinion is another factor to be taken into account. A survey was conducted in USA covering more than 10000 physicians on two aspects, physician assisted suicide [PAS] and withdrawal of life sustaining treatment [LST]. The result of PAS showed that 46% of physicians agree that it should be allowed in some cases; 41% do not agree, and 14% think it depends on circumstances. Survey on withdrawal of LST revealed that 16% will do so even if they think that it is too early, 55% will not do so, and 29% opined it will depend upon circumstances.<sup>15</sup> In Washington, 54% and 53% physicians thought that euthanasia and PAS, respectively, should be legal in some situations.<sup>16</sup> In Oregon, 60% of physicians thought that PAS should be legalized in some cases.<sup>17</sup> Survey in UK show 64% supports and 34% opposes assisted dying of patients who has incurable and painful disease.<sup>18</sup>

Considering all these factors it can be said that yes, if euthanasia is used with strict guidelines will be beneficial for the society. So, legalisation of it is necessary to protect terminally ill patients to lessen their sufferings, to protect physicians, and to guide court to give judgement if such an appeal is made. In the process of legalisation we mustn't forget the slippery slopes like performing euthanasia without consent, unauthorised persons conducting it, using for personal gain like acquiring properties, may be a special danger to under-privileged group like children, elderly and disabled person, physician acting clandestinely to support their patients, non reporting of cases and utmost care should be taken to prevent those.

After long debate, on all relevant matters it was legalised in Oregon, USA in 1994, suspended in 1995 because it did not give equal protection against suicide to terminally ill persons. Again, it was legalised in 1997 by death with dignity act to give permission to PAS. It was only in 1999, the House of Representatives voted to amend the act to make it a federal crime for doctors to prescribe drugs for terminally ill patients to end their lives. This ended the practice of legalized PAS in Oregon.<sup>19</sup> Subsequently, euthanasia and assisted suicide was legalised in Belgium and Netherlands in 2002,<sup>20</sup> assisted suicide in Switzerland in 2003,<sup>21</sup> Luxemburg and Washington in 2008,<sup>22</sup> Montana in 2009 and in Vermont since 2013 with strict guidelines but banned in Michigan because Dr Koverkein misused it.<sup>23</sup>

## INDIAN SCENARIO

In India, Euthanasia in any form is not legalised till today. Prior to 7<sup>th</sup> March 2011, all petitions requesting for euthanasia were rejected stating that right to life does not include right to die [Article 21, COI]. On 7<sup>th</sup> March 2011, Supreme Court rejected appeal for euthanasia for Aruna Shanbaug stating that active euthanasia is illegal as it is crime under section 302 and 304, IPC<sup>24</sup> but, passive is legal even without legislation provided certain safeguards are maintained. As part of judgement of this case Supreme Court issued guidelines which will be law until govt legalises it.<sup>25</sup> After the judgement on this landmark case, Union law Ministry wrote to the 19<sup>th</sup> Law Commission on 20<sup>th</sup> July 2011 to give a report on its feasibility. Law Commission responded quickly and on 11<sup>th</sup> August 2011 submitted the report 'Euthanasia- A relook' proposing to follow Supreme Court's directive as guidelines for this matter<sup>26</sup> which will be binding as law [Article 226, COI] till

it is legalised. It states that:

1. Permission must be obtained from High Court [parens patriae].
2. A competent patient has right to refuse invasive medical treatment by way of artificial life sustaining measures and such decision is binding to doctors, hospitals if it is an informed decision.
3. A terminally ill competent patient shall not be deemed of any offence by any law for such decision.
4. Minor above 16 yrs can do so along with the consent of major spouse and one parent.
5. Decision to discontinue LST for incompetent patient should be taken by parents, spouse, close relatives or next friends and should be for the best interest of the patient.
6. When an appeal is made before court, the Chief Justice should constitute a bench of 2 judges.
7. A committee with 3 reputed doctors will be formed to give a report on the condition of the patient.
8. This report will be given to the relatives and state, hearings should be taken after that, final decision should be taken for the best interest of the patient and order will be issued by the High Court.<sup>27</sup>

India is a country with diverse religious population. Any act which is against the religious opinion will not be accepted by the society. Considering this, The Telegraph asked for opinion from religious leaders of the Hindu, Muslim, Jain and Christian community. While the Jain, and Christians said passive euthanasia is acceptable under certain circumstances, in Hindus and Jain ending one's life is allowed by starvation if one thinks that his life is complete.<sup>28</sup>

On 16<sup>th</sup> July 2014, Supreme Court after hearing Prasant Bhusan, counsel for the petitioner common cause, an NGO arguing that 'Right to life' includes 'Right to die with dignity and people must have right to execute 'Living Will' to refuse treatment and die, decided to adjudicate legality of active and passive euthanasia in India and issued a notice to all states and union territories to opine on this legally controversial issue, however Govt. opposes it. Attorney General Mukul Rohtogy stated Govt. doesn't accept euthanasia as a principle and court has no jurisdiction to decide it.<sup>29</sup>

## CONCLUSION

To summarise, Euthanasia can be considered sometimes from ethical, moral, social, legal and civil right point of

view. Parliament need to pass bill on this matter to lessen sufferings of patients with strict guidelines to prevent misuse of it .We have to follow the directive of Supreme Court until Euthanasia bill is passed.

**Conflict of interest:** None

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REVIEW PAPER

## Concept of Epidemic Diseases in Ayurveda

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### ABSTRACT

*The concept of epidemic was very much well defined in Ayurveda. Acharya Charaka, the great physician of all ages had mentioned the epidemic diseases under the heading of 'Janapadodhwamsa'. Ancient ayurvedic scholars are more familiar about epidemic diseases along with mode of spread. Certain group of diseases is transmitted from one person to another by direct or indirect contact, while another group of diseases born from common source of polluted air, water, land or disturbed climate, which refers to the broad heading of 'Janapadodhwamsa'. Nature has significant impact on the health as well as diseases. The concept of epidemics in Ayurveda, conveys the message that whenever an effort is made to disturb the nature, it has a tendency to destroy it back. This paper is an attempt to highlight the concept of epidemics, its causative factors and management as mentioned in the Ayurvedic classics. The prime intention of this review study is to prevent people from getting affected by epidemic diseases and its management through Ayurveda.*

**Keywords:** Janapadodhwamsa, epidemic, Ayurveda

### INTRODUCTION

Ayurveda deals with all aspects of life including the surrounding environment where we reside. It is based on the relationship between mother nature and human beings. Nature has significant impact on health as well as in creating diseases. Whenever an effort is made to disturb nature, it has a tendency to destroy it back which leads to the vitiation of air, water, land and climate ultimately leading to mass destruction of people and wealth. This is termed as Janapadodhwamsa in Ayurveda which is closely associated to the modern scientific knowledge of epidemics. The concept of epidemics in Ayurveda is very much well defined. Ayurveda has considered unnatural activities of people as the reason behind the vitiation of air, water, land and season which are common to all living individuals leading to epidemics.<sup>1</sup>

This study has been carried out critically by considering all the factors such as various human unnatural activities leading to mass destruction and diseases in the ancient days which is still relevant in the present era and its management.

There was much debate in the 19<sup>th</sup> century about the origin of diseases. During this time there were theories to explain infectious diseases in general. The Greek physician Hippocrates (460-377BC) known as 'the father of medicine' was the first person known to have examined the relationship between the occurrence of the disease and environmental influence. He believed that diseases are caused by an imbalance of four humors air, fire, water, earth or 'atom'.<sup>2</sup> He has coined the terms 'Endemic' and 'Epidemic'; Endemic diseases are usually found in some places, whereas 'Epidemic' diseases are those which are seen at times but not others.<sup>3</sup> Another theory which was most widely accepted was the Miasma theory. The Greek

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word Miasma stands for pollution. Miasma was considered to be a poisonous vapour or mist filled particles from decomposed matter that causes illness.<sup>4</sup>

Authors of ancient Ayurvedic texts were much familiar about epidemic diseases along with the mode of spread. Certain group of diseases is transmitted from one person to another by direct or indirect contact, while another group of diseases is born from a common source of polluted air, water, land and disturbed climate, which refers to the broad heading of 'Janapadodhwamsa'.

The term 'Janapadodhwamsa' is a compound term composed of 'Janapada' and 'Dhwamsa'. 'Janapada' means community, nation, people, an empire or people belonging to a country. 'Dhwamsa' means perishing or destruction.<sup>5</sup>

Ancient sanskrit classics like Astadhyayi, Ramayan, Mahabharat and numerous Puranas refer Janapada to the earliest gathering places of men.

From all these points it can be concluded that the term 'Janapada' was used to denote collection of large number of people residing in a specific region. The nearest co relation for this concept in the modern contemporary science is epidemics.

According to definition, an epidemic disease is the rapid spread of infectious diseases to a large number of people in a given population within a short period of time, usually two weeks or less. Epidemics are generally caused by several factors including change in ecology of the host population (increased stress or increased density of vector species); a genetic change in the pathogen reservoir or the introduction of an emerging pathogen to a host population.<sup>6</sup> Generally an epidemic occurs when host immunity to either an established pathogen or newly emerging nobel pathogen is suddenly reduced below that is found in the endemic equilibrium and the transmission threshold is exceeded.<sup>7</sup>

An epidemic may be restricted to one location; however if it spreads to other countries or continents and affects a substantial number of people, it may be termed as pandemic. The declaration of an epidemic usually requires a good understanding of a baseline rate of incidence.<sup>8</sup>

#### ETIOLOGY OF EPIDEMICS IN AYURVEDA

According to Ayurveda, there are mainly three root causes of all diseases. They are<sup>9</sup>:-

1. **Pragyaparadh:** Mistake of intellect; the mistakes performed by intellect is classified into 3 groups-
  - i. **Dhi (intellectual):** mistake due to lack of intellect or ignorance.
  - ii. **Dhriti:** lack of awareness produces mistakes.
  - iii. **Smriti or Smritibhramsa:** mistakes due to loss of memory.

Simply in this context 'Pragyaparadh' is disobeying the laws of nature.

2. **Asatmyendriyarthasamyoga:** Improper contact of senses with their objects, results in an over stimulation and deficiency of sensory activity. This harms the body and mind which requires moderation and harmony internally and externally for healthy functioning.
3. **Parinam or Kala:** The external environment can trigger disease by unbalancing the body through unnatural and extreme variations in temperature, rainfall or wind which in turn leads to causation of epidemics. It also refers more generally to the effects of time and natural physical transformation that occur over time. For example, seasonal influences on the disorders associated with specific phases of life and ageing are all in this category.

As described above, in the present era we also find some of the anthropogenic factors causing air, water and land pollution along with various other factors leading to climatic change.

#### Anthropogenic factors for air pollution<sup>10</sup>

1. **Stationary source:** Include furnaces, waste incinerators and ores manufacturing facilities, power plants and all types of fuel burning heating devices.
2. **Mobile source:** Automobiles contribute 50% of carbon monoxide to atmospheric air. These include motor, aircraft and marine vehicles among others.
3. **Forest fires:** Forest fires generate fogs rich in fine particles. Apart from chemical reaction, the other major source of particulate matter is burning fire.
4. **Waste deposition:** Waste depositions in landfills generate methane which is highly inflammable and may form explosive mixtures with air. Methane is also Asphyxiants and may displace oxygen in an enclosed space.
5. **Military resource:** Military activities like manufacture

and use of nuclear weapons, use of toxic gases and germ warfare during wars and adventures into rocketry are all potential sources of air pollution.

#### Anthropogenic factors for water pollution<sup>11</sup>

1. **Industrial sources:** Water is an essential raw material in almost all manufacturing plants. In India, industries such as tanneries, sugar mills, pulp and paper mills, distilleries, oil refineries, etc., are prominent in this context.
2. **Domestic sources:** In urban areas, municipal sewage is discharged into the nearby canals, thus polluting the canals and also deteriorating the ground water.
3. **Agricultural sources:** Pollutants are discharged into watercourse due to agricultural activities like agricultural runoff, synthetic fertilizers, herbicides, insecticides and plant residue, etc. These water bodies get fertilized by nutrients resulting in Eutrophication and thus causing water pollution.
4. **Mining sources:** Natural or man-made geochemical alterations are also sources of wastewater pollution. Mining operation also produces soluble toxic materials depending upon the geological formation.

#### Anthropogenic factors for land pollution<sup>12</sup>

1. **Accidental disasters:** Accidents in the oil and mining industries cause hazardous impact on environment destroying wetlands and recreational beach proprieties.
2. **Coal Mining:** The mining process requires displacement of soil and introduces chemicals and other pollutants into the environment.
3. Waste management of landfills.
4. **Pesticides and agricultural practices:** Harmful chemicals used in agriculture collect in the soil and eventually create contaminated soil.
5. **Logging and clear cutting:** Irresponsible methods of harvesting trees can lead to soil erosion and serious land changes.
6. **Unpaved Roads:** This is one of the most overlooked causes of land pollution.

#### Anthropogenic factors for climate change<sup>13</sup>

Anthropogenic climate changes refer to the production of green house gases by various human activities. Green

house effects resulted from human activity such as CO<sub>2</sub> emission from fossil fuel burning, gasoline for transportation, deforestation, increase usage of chemical fertilizer on croplands, etc., causes global warming which in turn results in climatic changes like rise in sea level worldwide, more killer storm, wide spread extinction of species, disappearance of coral reefs, etc.

The factors described above are responsible for the causation of epidemic diseases raising the levels of destabilization. One of the least predictable, but potentially most devastating effects is the climate change which will be increasing levels of epidemics, pandemics, infectious diseases, malnutrition, etc. As the temperature rises, so do the smog levels and the pollutant present in it as carbon monoxide, sulfur dioxide, nitrogen dioxide and ground level ozone resulting in increasing disease conditions caused by these pollutants, such as decrease immune system function, emphysema, asthma, cardiovascular diseases and decrease physical performance. Smog also greatly limits the level of photosynthesis, resulting in disappearance of plant species and decrease agricultural yields.

Many infectious diseases are expected to greatly increase their numbers as the rise of temperature helps for the production and spread of disease vectors such as mosquitoes, flies, different disease causing insects. Malaria in particular is expected to become a huge problem throughout the world. Spread of infectious diseases is also greatly influenced by large-scale migration and increase human population density, which are also likely the effects of climate change. Many of the largest pandemics in human history have been as a result of spreading human population.

#### MANAGEMENT OF EPIDEMICS THROUGH AYURVEDA<sup>14</sup>

Even with the availability of powerful pharmacological agents epidemics are unmanageable and preventive measures like limitation of spread by isolation and strengthening the immune system are key points.

The concept of microorganism has been well emphasized in Ayurveda in the context of Krimi, Bhuta and Graha, etc., due to unhygienic practices. Management is also very similar to modern microbiology. Avoiding the factors responsible for the causation of the disease removal of the microorganism from the affected site (Apakarsanam) and bringing



change in the environment has been suggested by Charaka for the management of infectious diseases.

The line of treatment should be planned at breaking of aetiopathogenesis and according to symptomatology. Some preventive measures mentioned in Ayurvedic classics are listed below:

1. Procurement of medicine or herbs in their high potential phase well before the outbreak of epidemic.
2. Improving the immunity and the strength of the body.
3. Moving to safe places away from the polluted environment/ air/ water and so on.

These measures can be taken before hand by observing the cyclical occurrence of the epidemic. The measures to foresee the outbreak of the epidemic diseases have also been mentioned in the classics as prodromal symptoms. Various techniques have been described in Ayurveda for prevention externally at the environmental level as well as internally at the individual level. Some of them are mentioned below:

#### **At the environmental level**

##### **AIR PURIFICATION**

It has been advised that air purification can be done through fumigation (Dhupan) with certain medicinal plants, which have some anti microbial potential. The fumigation acts as a disinfectant and prevents various infectious diseases. The fumigation can also control the vectors, i.e. Mosquitoes, flies and so on, which can contribute towards disease control. Some common plants used in fumigation are Nimba Patra (*Azadirachta indica*), Sirishabeeja, Haridra (*Curcuma longa*), Vidanga (*Embilia ribes*), Arka Patra Devodara (*Cedrusdeodara*) Sarja Rasa, Apamarga (*Achyranthus aspera*). As general precautionary measures, clothes, bed sheets, etc. should be fumigated with the help of Sarsapa (*Brassica campastris*), Vaca (*Acorus calamus*), Brahmi (*Bacopa monnieri*), Ashoka (*Saraca indica*), etc. Effects of poisonous or polluted air causing symptoms like headache, cough, rhinitis, burning eyes, etc. can be prevented by purifying air by fumigating with Laksha (*Persicaria odorata*), Haridra Tagara Lavanga Patra Musta, etc.<sup>15</sup>

##### **WATER PURIFICATION**

Impure or contaminated water is the known factor in the causation of gastro intestinal disorders like cholera which can turn into an Epidemic. Ayurveda advises strict

avoidance of impure water containing worms, urine, stool, ova/eggs, dead bodies, decomposed material, leaves, poisonous materials and so on for internal as well as for external usage.

Water may be highly contaminated, slightly vitiated or minimally vitiated. Purification of highly contaminated water is to be done through boiling. Slightly vitiated water can be purified by quenching hot iron ball and minimally vitiated water may be purified by the exposure to sun rays. Nirmali is recommended in the Ayurvedic classics, which is a well-known water purifier.

At the individual level: Individual protection can be done by adopting a healthy lifestyle and taking some preventive measures as described in Ayurveda. Ayurveda advises some special modalities which are being briefly described below:

##### **ROLE OF RASAYANA<sup>16</sup>**

Rasayana is the Rejuvenative therapy, used to boost the immune system. Rasayana not only improves the immunity but also treats diseases at times. It can interrupt the course of the disease and prevent from becoming a full-blown stage of the disease. Various scientific studies have been carried out to prove the mode of action of Rasayana. DNA protective activities and immunomodulatory properties of the fresh juice of *Cynodondactylon* are being proved while validating the traditional use of the herb as Rasayana in Ayurvedic system of medicine. Drugs like Aswagandha, Satavari, Amlaki Haritaki, etc., act as Rasayana and also cure diseases.

##### **ROLE OF AYURVEDIC ANTIOXIDANTS**

Antioxidants and immunomodulators could help to prevent occurrence of infectious diseases like Swine Flu; antioxidant supplement may be used in the management of Swine Flu and it may be taken as a preventive medicine throughout any infection phase.<sup>17</sup> This principle can be adopted in the management of all other epidemic diseases. Some other drugs providing antioxidant property in the body are Aswagandha powder, Satavari powder, Amalaki Rasayana, etc.

##### **ROLE OF PANCHAKARMA THERAPY**

Panchakarma is the natural detoxifying therapy comprising of five purificatory measures. It has been scientifically proven that natural purificatory treatments can successfully eliminate toxic and infectious substances without damaging or causing any side effects.

## ROLE OF DIET

Ayurveda also gives emphasis on the diets and regimens to maintain health and prevent occurrence of diseases.

## CONCLUSION

The history of infection and epidemic diseases is as old as mankind. The references of microorganisms are available in the oldest manuscripts of Vedas and Ayurveda. Atharva Veda also mentioned microbes and infectious diseases. Throughout history there are number of pandemics and epidemics such as Small pox, Tuberculosis, Bird flu and most recent being the 2015 outbreak of Swine Flu in India affecting more than fifty thousand people. This review paper is an attempt to highlight the idea of Ayurveda in the causation and management of Epidemics.

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## CRITICAL REVIEW

# Documentation of Medical Record in Day-to-Day Medical Practice

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## ABSTRACT

*Proper documentation of medical records promote patients' and physicians' best interests for many reasons. Recording all relevant data of a patient's care helps physicians monitor what's been done, and curtails the risk of mistakes scrambling into the treatment process. Systematic medical records document basic facts about the patient's health care delivery system, including who did what, and what results occurred. Improper documentation on the other hand may invite medical litigation at any point of time. Sound record keeping also plays a role in quality assurance practices; hence medical litigation can be avoided.*

**Keywords:** *Medical record, medical litigation, documentation*

## INTRODUCTION

The terms medical record, health record, and medical chart are used somewhat interchangeably to describe the systematic documentation of a patient's medical history and care, time to time within one particular health care provider's jurisdiction.<sup>1</sup> Medical records include a variety of type of 'notes' entered over time to time by health care providers, recording observations, administration of drugs, surgical interventions, orders for the administration of drugs and test results, etc. The maintenance of complete and accurate medical records is a requirement of health care providers and is generally enforced as a licensing prerequisite.

Nothing is more devastating to an innocent physician's defense against the allegations of medical malpractice than an inaccurate, illegible or skimpy record, except for a record that has been changed after the fact, and therefore inevitably compromises the otherwise defensible case.<sup>2</sup> The medical record is the basic legal document in medical malpractice litigation. A well-organized, well-written record is the best defense for the competent health care provider. A poorly written, disorganized record is a strong evidence of an incompetent health care provider. The poorly kept record is not, in itself, proof of negligence on the part of the health care provider, but it is proof of substandard care.<sup>3</sup>

Medical malpractice litigation is built around the medical record, which provides the only objective record of the patient's condition and the care provided. Records are particularly important for a physician's defense. It is the physician's responsibility to keep the medical record. The patient has injuries to show the court; the physician or

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other health care provider has only the medical records to prove that the injuries were not due to negligence. If the record is incomplete, illegible, or incompetently kept, this is the physician's failure.

### SIGNING ON MEDICAL RECORDS

Special attention has to be given while signing on medical records. Signing on a fake medical certificate can invite medical litigation (**Case Report-1 & 2**).

#### Case Report-1

*The police have zeroed in on a group of government doctors allegedly running a racket in collusion with private hospitals to falsely implicate people in criminal cases by "inflicting" injuries on persons wanting to settle scores with their rivals. Based on the "doctored" injuries, a medico-legal report would be issued for the "victim," which would be used to get a case of attempt to murder registered against one's rival.<sup>4</sup>*

#### Case Report-2

*A woman government doctor was sentenced to one year rigorous imprisonment by a special Central Bureau of Investigation (CBI) court for issuing fake medical certificates. The doctor, Asha Kiran, was caught red-handed by the CBI along with her husband Vinod Kumar while issuing a fake medical certificate to a woman for money here in 2001. Joginder Kaur, who got a fake medical certificate from Kiran, was working with the Chandigarh health department and presented the medical certificate in the Punjab and Haryana High Court to get bail on medical grounds in a murder case. The complainant in the murder case got a whiff of the fake medical certificate and sent a decoy patient to Kiran. The patient was asked to pay Rs. 6,000 for a fake certificate. The CBI then laid a trap and nabbed Kiran.<sup>5</sup>*

### RECORD OF MEDICAL CERTIFICATES

While the health care provider records a medical certificate or other, they should follow the following three basics: (i) The doctor should keep a copy of medical certificate issued, (ii) maintain a register containing full details of medical certificate issued and (iii) it should be issued on an approved proforma.

The medical officers shall not omit to record the signature and/or thumb mark, address and at least one-identification mark of the patient on the medical certificate or report.<sup>6</sup>

### USERS OF MEDICAL RECORDS

One can hypothesize that initially the records may have been kept more for the physician's interest rather than anything else. Just as advances in modern medicine are progressing in leaps and bounds, the needs for a good hospital records is also increasing.<sup>7</sup> There are many meaningful users of health information for different purposes as follows (**Table 1**).

**Table 1** Different users of Medical Records

Primary users	Secondary users	Third party users
<ul style="list-style-type: none"> <li>– Attending physician (themselves)</li> <li>– By other physicians (for consultation)</li> </ul>	<ul style="list-style-type: none"> <li>– Nursing/paramedical staff</li> <li>– Patient (during consultation or referral/for future)</li> <li>– Hospital administrators</li> <li>– Students teaching</li> <li>– Clinical Research</li> <li>– Epidemiology, Statistics</li> <li>– Insurance companies</li> <li>– Tool for training of medical staff</li> <li>– Anticipate future health problems</li> <li>– Serve basic for standard preventive measures</li> </ul>	<ul style="list-style-type: none"> <li>– Social worker</li> <li>– Occupational therapist</li> <li>– Audit purpose</li> <li>– Accreditation purpose</li> <li>– MCI/CEA purpose</li> <li>– Government agencies (Statutory bodies: PCPNDT Act, MTP Act, etc., Blood bank licencing)</li> <li>– Court of law (during trial)</li> <li>– Investigating agencies (police, internal enquiry, criminal negligence enquiry)</li> </ul>

### CONTENTS OF MEDICAL RECORD

A patient's individual medical record identifies the patient and contains information regarding the his medical history. The health record as well as any electronically stored variant of the traditional paper files contain proper identification of the patient.<sup>8</sup> However a complete medical record for inpatients should show the followings:

- Demographic data
- Para clinical data
- Clinical data
- Therapeutic data
- Documentary items
- **Ancillary diagnostic media:** X-Ray/CT/MRI Scans, pathology specimens/documents, ECG/EEG and photographs, etc.
- **Miscellaneous:** Consent form, MTP forms, insurance records, legal documents and correspondence (referral form/consultation advise), etc.

The bedhead ticket should also reveal the bed allotment, ward number and others. Details of procedures performed on the patient should be mentioned including dietary supplements, dressings including self-medication if any.

### **TYPES OF MEDICAL RECORDS**

Broadly, medical records are of two types, viz., (i) personal and (ii) impersonal used for research or statistics. They can also be further divided as: (i) paper records (hard copies) and (ii) computerized records.<sup>7</sup>

### **IMPORTANCE OF MEDICAL RECORDS**

A medical record documents a member's medical treatment, past and current health status, and treatment plans for future health care and is an integral component in the delivery of quality health care. Besides individual interest it has some other purposes as follows:

- Quality of patient care/continuity of medical care
- Medical education
- Research
- Efficient administration
- Communication device between multidisciplinary team/ group practice
- Medical audit
- Medical tourism (transmission)

### **PROBLEMS OF MEDICAL RECORDS**

While physicians acknowledge the importance of the medical record to both patient care and medical education, there is increasing awareness that the record along with our current system of processing medical information is seriously deficient. The extent of these deficiencies has serious implications for the usefulness of current practices of medical record audit. Followings are the main problems:

- Legibility (hand writing, typed, computer generated)
- Retention and preservation
- Confidentiality
- Privileged communication
- Storage (space)
- Uniformity
- Utility
- Quality
- RTI
- Terminology/Abbreviations
- Retrieval (timing)
- Medico-legal reporting

One of the biggest problems of medical records amongst those is the illegible handwriting. To find a cure for this problem, the hon'ble Punjab and Haryana High-Court has reminded the doctors that they should not scrawl on documents for self consumption; and has even asked the directors of health services in Punjab, Haryana and Chandigarh to ensure that the element of legibility is injected into their handwriting.<sup>9</sup> It turns out that all those jokes about doctors' scrawl are not funny at all. Doctors' illegible handwriting causes 7,000 deaths in the US every year and another 1.5 million Americans report minor adverse reactions—be it diarrhea or rashes—or even death. A movement has begun in Mumbai asking the medical fraternity to write prescriptions in “separate, capital letters”. The brainchild of an NGO called the Forum for Enhancement of Quality in Healthcare (FEQH) and the Quality Council of India (a semi-government organization accrediting services), the first meeting on the issue held last week was attended by representatives of medical associations and NGOs. The campaign borrows from QCI's hospital accreditation system called the National Accreditation Board for Hospitals (NABH), which requires prescriptions to be written in capital letters.<sup>10</sup>

### **EASE OF RETRIEVING MEDICAL RECORDS AND CONFIDENTIALITY**

Medical records should be organized and stored in a manner that allows easy retrieval and are to be made available as and when required. Computerization of medical record can help by easy and fast retrieval and reduced space requirement.

Medical records are stored in a secure manner that allows access to authorized personnel only and is protected against unauthorized or inadvertent disclosure. The handling staff should receive periodic training in confidentiality of member information. Medical records are safeguarded against loss or destruction and are maintained according to state requirements.

### **PRESERVATION OF MEDICAL RECORD**

The records should be kept under lock and key, in the custody of the doctor concerned or may be kept in a Central Record Room, in hospitals where such facility is available; as per the institution's rules. Most hospitals have a policy of maintaining all medico-legal records for variable periods. However, as per law, there is no specified time limit after which the MLR's can be destroyed. Hence, they have to be preserved permanently. In view of the

multitude of cases against the doctors under the Consumer Protection Act, it is advisable to preserve all the in-patient records for a period of at least 5 years and OPD records for 3 years.<sup>6</sup>

As per the MCI provisions under Regulations, 2002, every physician shall maintain the medical records pertaining to his/her indoor patients for a period of 3 years from the date of commencement of treatment in a standard performance laid down by MCI. If any request is made for medical records either by the patients/authorized attendants or legal authorities involved, the same may be duly acknowledged and documents shall be issued within the period of 72 hours.<sup>11</sup>

### **PNDT ACT AND MEDICAL RECORD**

Section 29 of the PNDT Act, 1994 requires that all the documents be maintained for a period of 2 years or until the disposal of the proceedings. The PNDT Rules, 1996 requires that when the records are maintained on a computer, a printed copy of the record should be preserved after authentication by the person responsible for such record.<sup>12,13</sup>

### **PROVISIONS UNDER THE RTI ACT, 2005**

Under this Act every citizen has got the right to obtain a copy of medical records. Section 3 of the RTI Act confers right to information to all the citizens and corresponding obligation under Section 4 on every public authority to maintain record so that the information sought for, be provided.<sup>14</sup>

In the case of T.S.R., Subramanyam<sup>14</sup>, their lordships of Hon'ble Supreme Court settled that nothing should be done by oral instructions and the practice of giving oral directions by administrative superiors and public executives, would defeat the object and purpose of RTI Act and shall give room for favouritism and corruption. Division Bench clarified that in view of the above, every decision taken for the purpose of treatment of a patient or instruction issued by the doctors to their subordinates, must be converted in writing indicating the name of doctors. [Para 26]<sup>12,13</sup>

Court further added that "But, all these rights generally declared either in favour of citizens of this country or parties to the prosecution or litigation are only subject to certain reasonable restrictions either imposed by law or

even by rules, conventions, precedents, etc. One such restriction that is imposed regarding the issuance of a copy of the post mortem certificate, which is the subject matter of the above petition, Rule 591 of the Madras Police Standing Orders which is positive to the effect that 'originally the post mortem certificate has to be sent by the medical officer direct to the magistrate concerned in a sealed cover, the police being given a copy of it immediately after the examination is over' thus setting the procedure as to the issuance of the post mortem certificate and therefore revoking such procedures established by law. This court or any other court for the matter is not entitled to order to issue the copy of the post mortem certificate particularly when the investigation into the case registered regarding the death in encounter by the respondent police is still pending finality of decision by the police themselves and since the field is occupied entirely by the respondent, as it is held on the part of the Honourable Apex Court in general regarding any criminal case registered which is under investigation that the courts are of little or no chance to order such applications, citing the general provisions of law or even the constitutional provision which would set the outer line without specifying anything which has to be decided in the manner provided under the law on the specific subject and the propositions held by the upper forums of law do not help the case of the petitioner".<sup>15</sup>

### **IMPROVED OUTCOMES**

Keeping proper medical records improves patients' clinical outcomes once they leave the hospital, according to a November 2006 report by the Ontario Ministry of Health and Long-term Care. About 20 percent of patients experience adverse events after discharge, including drug reactions, infections and procedural complications. Many of these problems result from delayed or incomplete information given to subsequent health care providers. The ministry's report also cited a 2003 study that found patients with significant gaps in their health records spent an average of 1.2 hours longer in emergency rooms.<sup>16</sup>

### **MALPRACTICE DEFENSE**

It is indeed necessary for doctors to remember that their ignorance can't be the defense in the court. Therefore, there is a need to make a culture to keep medical records systematically. Proper documentation is the best defense against a negligence claim. For court, if a procedure

doesn't appear on a chart, it hasn't been done.

Physicians must ensure that all X-rays and other lab work are done, and followed up with the patient. This step minimizes the risk of a missed diagnosis. Good record keeping is also vital in dealing with patients who are abusive, decline to follow advice, or present the same complaint without improvement.

### Case Report-3

*The Supreme Court ordered one of the highest compensations so far in the country in a case of medical negligence Rs 1.8 crore. The Tamil Nadu government had to pay the sum to a 18-year-old girl who lost her vision at birth due to medical negligence at a government-run hospital. The girl, who is now 18 years old, was born prematurely at the government hospital in Chennai's Egmore. But, she was discharged from the hospital without a retinopathy test, a must for preemies. By the time the family discovered the lapse, the girl had lost her vision. Her father then approached the National Consumer Forum, which awarded Rs. 5 lakh. Unhappy with the compensation, the family then approached the top court.<sup>17</sup> In this case no record of referral to ophthalmologist was found during the time of her birth.<sup>18</sup>*

### CONCLUSION

Therefore clinical record should be structured around the patient's problem rather than medical problems and updated in detail on a daily basis as suggested by Weed.<sup>19</sup> It is also important for the clinician to maintain a proper doctor patient relationship, besides maintaining a good medical record. The patient doctor relationship is a vital concept in health care. A good relationship increases adherence to treatment recommendations, enhances continuing care and promotes patient satisfaction and can reduce the medical litigation.<sup>20</sup>

In conclusion, it can be suggested that the members of the legal profession, our law courts and everyone concerned should also keep in mind that a man in the medical profession should not be unnecessarily harassed for purposes of interrogation or any other formality. He/she should not be dragged during investigations at the police station which should also be avoided as far as possible.

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ORIGINAL PAPER

# Oral Hygiene Practices Among the General Population of North Eastern Region of India

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## ABSTRACT

*Oral and dental diseases are common problems among the masses. From the era of early civilization, people have been using various readily available materials for cleaning their teeth. With the steady development of medical science, people are much aware of their general as well as oral health. Even then, a large part of our population is still using various harmful materials for routine cleaning of their teeth. Therefore, a study was contemplated to find out the pattern of oral hygiene habits among random samples of common people residing in North East India. A descriptive study method was used to collect data, which was recorded in a specially prepared proforma. Statistical analysis of the recorded data shows that although majority of the population are using various branded commercial dentifrices, a countable number of the sample subjects are not much aware of their oral health and are using various readily available materials for cleaning their teeth. This study indicates that education and motivation is the need of the hour to inculcate good oral hygiene habits among the masses, which can prevent common dental diseases to a large extent.*

**Keywords:** Oral health, dentifrice, oral hygiene habits, general population

## INTRODUCTION

Various oral and dental diseases have affected the human population since prehistoric time. Human civilization has been using various indigenous naturally available materials for cleaning their teeth. But with the passage of time there has been a constant effort to improve the materials used for oral hygiene practices. Various studies<sup>1,2</sup> clearly establish the fact that mechanical oral hygiene procedures practiced by the common people are not enough for adequate control of biofilm from the oral cavity. In view of the limitations of mechanical plaque control in preventing oral diseases, chemical methods of biofilm control from the oral cavity has been explored for a number of decades. Various herbal and synthetic agents are being incorporated to augment the effect of mechanical oral hygiene procedures for better plaque control. Although with the advancement of time, more and more people are gradually using various modern oral hygiene materials for attaining better oral health, a considerable part of the population is still using various harmful materials for cleaning their teeth. The National Epidemiological Oral health Survey and Fluoride mapping of India report<sup>3</sup> stated a high prevalence of gingival and periodontal diseases. In its report, it has been stated that gingival and periodontal diseases are prevalent in 67.7% of 15 year olds and as much as 89.6% aged between 35-44 years, which is quite higher than the prevalence of dental caries in India. This report shows the magnitude of periodontal diseases and dental caries in our country. Therefore, a study was contemplated to find out the oral hygiene habits of the common masses residing in the greater Guwahati area of the North East.

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## AIMS AND OBJECTIVES

- To study oral hygiene practices of the sample population.
- To study oral health awareness of the sample population

## MATERIALS AND METHODS

A descriptive study method was used to collect data from the sample population. A questionnaire was specifically prepared for this study to record the data of the sample subjects. A random sample of 680 adult person's data was recorded and compiled and analyzed statistically to find out oral health awareness and oral hygiene practices of the sample population.

**Area of the study:** The sample population of this study was from the greater Guwahati area of North East India. Guwahati is considered as the gateway to the Northeastern region, and a variety of people of different ethnic groups, culture and also of different socio-economic status reside here since historical time.

**Sample of the Study:** The samples for the study were selected at random without any consideration of sex, religion, ethnic group, educational status and socio-economic status. The outline and purpose of the study was explained to the sample subjects and consent was obtained prior to recording of their data.

## RESULTS AND OBSERVATIONS

The present research work has been designed to study the oral hygiene practices and also to evaluate oral health awareness of the sample population. A random sample of 680 adult person's data was recorded to find out their oral hygiene habits and their selection of dentifrices. The recorded data was statistically analyzed to find out their oral hygiene practices and also to evaluate their oral hygiene awareness. The findings of the survey is presented in **Table 1**, which shows that people are using varieties of dentifrices for their routine oral hygiene procedures that ranges from different types of commercial toothpastes, gels (61.91%), powders (23.97%), tree twigs (7.94%), charcoal, ashes, domestic salt and mustard oil (6.18%). Many of the sample population were found to indulge in various harmful oral habits like betel nut chewing with and without tobacco, smoking, and using various smokeless tobacco products. It has also been found that majority (94.12%) of the sample population cleans their teeth only once in the morning. It has also

been observed that majority of them (85.59%) are ignorant on the importance of oral hygiene and oral health.

**Table1** Table showing different categories of dentifrices used by the study population

Type of Dentifrices	No	%	Sub type of Dentifrices	No	%
Paste/Gel	421	61.91	Regular Conventional	299	43.97
			Herbal	122	17.94
Powder	163	23.97	Regular Conventional	68	10.00
			Herbal	95	13.97
Tree Twigs	54	7.94			
Charcoal, Ashes, Salt, oil	42	6.18			

## DISCUSSION

Dental caries and periodontal diseases are the two most common oral diseases, which affect human population irrespective of age, sex, religion, and socio-economic status. Pilot T et al 1987,<sup>4</sup> while reviewing the CPITN data of the W.H.O. global oral data bank found that gingivitis of varying severity is nearly universal in children and adolescents. A number of epidemiological studies conducted in India, clearly shows the widespread prevalence of gingival and periodontal diseases.<sup>5-7</sup> Even in developed countries like America, where the standard of personal oral hygiene is high, more than 80% of the population is suffering from gingivitis.<sup>8</sup> This is because of the fact that personal oral hygiene procedures practiced by majority of individuals are not optimum to remove the bacterial biofilm from all over the oral cavity, which is the causative factor for initiation and progression of gingivitis and dental caries.

In the present study, the investigator recorded data from a random sample of 680 persons to find out their oral hygiene practices and their selection of dentifrices for daily oral hygiene procedures. Statistical analysis of the recorded data has shown that people of lower socio-economic status were using varieties of dentifrice powders and a small percentage of the sample population were also using various tree twigs, charcoal, ashes and even domestic salt and mustard oil. In our study, we have found that a good percentage of the sample population (61.91%) is using paste or gel type of dentifrice. It has also been observed that majority of the study population

(94.12%), practices oral hygiene procedures only once in the morning. The findings and observations of our study are in accordance with the findings of the study by Mohire NC et al.<sup>9</sup> They conducted one clinical survey on the current status of oral hygiene on a sample subject and their observed order of dental cleaning agent was toothpaste (71.66%), tobacco misery (21.65%) and others (8.32%). They observed that tooth cleaning by coarse powders result in scratches on the teeth and long-term use leads to staining of teeth and oral mucosa. Their use fails to adequately remove dental plaque from the teeth surfaces due to improper cleaning method that fails to reach all the surfaces of the teeth. They also observed that brushing frequency of the majority of the study sample was once a day, which is also in accordance with the findings of the present study. They also observed that the oral problems were more prevalent in the rural areas (62.49%) in comparison to the urban areas (37.49%) and the awareness level of good oral hygiene practices were less in rural population than that of the urban population.

Madden I M et al<sup>10</sup> in their study on oral health status and access to care in a rural area of India and Chawla T N et al<sup>11</sup> in their study on prophylaxis procedures in the control of periodontal disease in rural area of greater Lucknow region of India, observed that traditional materials like chewing sticks fabricated from the local species of neem or miswak and abrasive substances such as charcoal and ash constitutes the usual oral health devices where access to conventional professional oral health care and education is restricted and low socio-economic status often precludes the purchase of modern oral hygiene products.

Almas K et al<sup>12, 13</sup> in their study on natural toothbrush found that the use of traditional materials is often entrenched in local folklore, forming part of the daily personal care regimen.

Al khateeb T L et al<sup>14</sup> observed that chewing stick fabricated from miswak is a part of the daily oral hygiene procedures of the common people which also has a deep religious significance.

The oral hygiene practices differ from community to community especially in the rural population. A number of herbal agents, which are being used for the oral hygiene procedures, are having antibacterial and antiplaque properties<sup>15, 16</sup>, but their use in the traditional unscientific way fails to control dental plaque adequately that initiates various gingival and periodontal diseases. With the rising

economy of India, people are becoming much more health conscious than ever before and are now slowly switching from the local and traditional products to various types of commercial branded toothpastes. Dentifrice manufacturers are adding various beneficial agents in their commercial preparations for additional benefits, which one may get during normal daily tooth brushing.

## CONCLUSION

In recent times, health care professionals are giving much importance to oral hygiene and oral health due to the emergence of the concept which links oral health with various systemic problems like heart attack, stroke, and preterm low birth weight babies. Nowadays, the dental health care provider's focus is not only to the oral cavity alone but also to the well being of the patient as a whole. World Health Organization (WHO)<sup>17</sup> endorses oral health as part of the general health, which is essential to quality of life.

As it has been found in this study that a portion of the common people are still habituated in using traditional materials like tree twigs, charcoal, table salt and even sand to clean their teeth as a daily oral hygiene procedure which quite often do a lot of harm to the teeth and their supporting structures. They are also not capable of removing dental biofilm from the inter-dental spaces and are hard to reach areas of the oral cavity resulting in accumulation of layers of plaque in these areas, which leads to initiation of dental caries and periodontal problems. Studies<sup>18</sup> have shown that despite the fact that considerable advances are being made in the design of manual toothbrushes; their use removes an average of only 50% of plaque from smooth tooth surfaces and even less from the inter-proximal regions. An additional limitation of the self performed mechanical oral hygiene procedure is due to the fact that mechanical plaque control procedures concentrate solely on the hard surfaces of the oral cavity that represents a relatively small percentage (21-23%) of the total area of the oral cavity.<sup>19</sup> Studies<sup>20</sup> have demonstrated that micro organisms involved in the etiology of gingivitis and periodontitis accumulate on several soft tissue surfaces of the mouth, which serve as a source of bacteria for translocation and colonization on the teeth surfaces. Due to the limitations of mechanical oral hygiene procedures to control dental biofilm effectively, the innovative idea of chemical control of dental biofilm has emerged and various chemical and herbal antiplaque agents are being incorporated in the dentifrices for supplementing the effect of tooth brushing.



The agents present in the dentifrices can reach the mucosal soft tissue surfaces and can exert antibacterial action causing better control of biofilm growth on the hard tissue surfaces as well as on the soft tissue surfaces of the oral cavity. India is a developing country and a lot of people are yet to get formal oral care from the dental health care providers. Dental caries and periodontal diseases can be prevented and controlled to a large extent if adequate measures are taken at an early stage of the disease directing high level of self performed plaque control procedures. In view of the magnitude of various forms of dental and periodontal diseases in India, it has become urgently necessary to concentrate on large-scale preventive measures to control these common oral diseases. It is the duty and responsibility of the dental health care providers to share and educate at mass level regarding the etiological role of dental biofilm for adequate control of periodontal diseases and dental caries and also for effectual motivation of individuals and communities to aspire good oral health. Oral hygiene really deserves and is destined to be an important and integral part of the overall hygiene of an individual. Health care providers not only have to educate and motivate the general population but also have to convey the message that good oral hygiene is absolutely necessary for overall good hygiene. The importance of oral health has been increased in many folds due to the recent concept of oral health and its link with many systemic diseases like heart attack and stroke. Promotion of oral hygiene measures at individual as well as in the community level is a must for achieving our goal of a disease free mouth.

**Conflict of interest:** No conflict of interest associated with this work.

**Contribution of author:** I, Dr Dilip Goswami, declare that this work has been designed and done entirely by me as appeared in this article and all liabilities pertaining to claims relating to the content of this article will be borne by me.

**Ethical clearance:** Done

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ORIGINAL PAPER

## Role of Cervical Cerclage in Obstetrics- A review in East of England Hospitals

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### ABSTRACT

**Objective:** The use and efficacy of cervical cerclage remains controversial. The Royal College of Obstetrics and Gynecology (RCOG) guideline in United Kingdom recommends history-indicated cerclage for women with three or more previous preterm births and/or mid-trimester losses. However, in clinical practice, cerclage is often offered with a history of one or more previous mid-trimester pregnancy losses.

**Method:** We did a retrospective review of 62 cases of cervical cerclage performed between the years 2006 - 2012. We reviewed the indications of cerclage, our local practice and analyzed the pregnancy outcome.

**Results:** 61% of the patients had elective cervical cerclage based on history of one or more previous mid-trimester pregnancy losses or preterm delivery, 32% had cerclage based on ultrasound and 6% had rescue cerclage. 76.7 % women had their cerclage removed after 37 weeks and delivered subsequently.

**Conclusion:** Cervical cerclage does appear to prolong pregnancy in high-risk women. Our local practice varies widely with the peri-operative management.

**Keywords:** Cervical cerclage, cervical insufficiency, preterm delivery

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### INTRODUCTION

Cervical cerclage is being performed for the treatment for cervical insufficiency since 1960 for the prevention of preterm delivery. Historically, studies have shown that the risk of cervical insufficiency increased from 2/1000 births among women aged 15-19 years to 7.5/1000 births among women aged 35-39 years. However, the incidence of cervical insufficiency diagnosis dropped by 44% from 1980 to 1990.<sup>1</sup> One of the reasons for this fall lies in the fact that the diagnosis of cervical insufficiency remains challenging. The definition of cervical insufficiency has been defined in various ways such as clinically; one or more 2<sup>nd</sup> trimester spontaneous pregnancy loss without any obvious sign of labour in absence of infection, bleeding or ruptured membranes or Sonographically by findings of short cervix 2.5 cm at gestational age of 16-22 weeks or evidence of shortening of cervix with or without funnelling on subsequent ultrasound. Various diagnostic tests have been used in an attempt to define cervical insufficiency such as patulous cervix on dilator test, defining cervix by hysterosalpingography in non-pregnant woman or calculating the cervical resistance index using cervical dilators.<sup>2-3</sup>

These methods are no longer in use to make the diagnosis of cervical insufficiency. Still there is no consensus for the diagnosis of cervical insufficiency and the clinical practice varies widely for the diagnosis and the use of cervical cerclage. Currently indications for cervical cerclage are either based on history of mid trimester loss or ultrasound indicated with cervical length of <25mm with or without signs of funnelling.<sup>4</sup> The use and efficacy of cervical cerclage also remains highly controversial.<sup>5</sup> The published guideline at RCOG recommends that 'History-

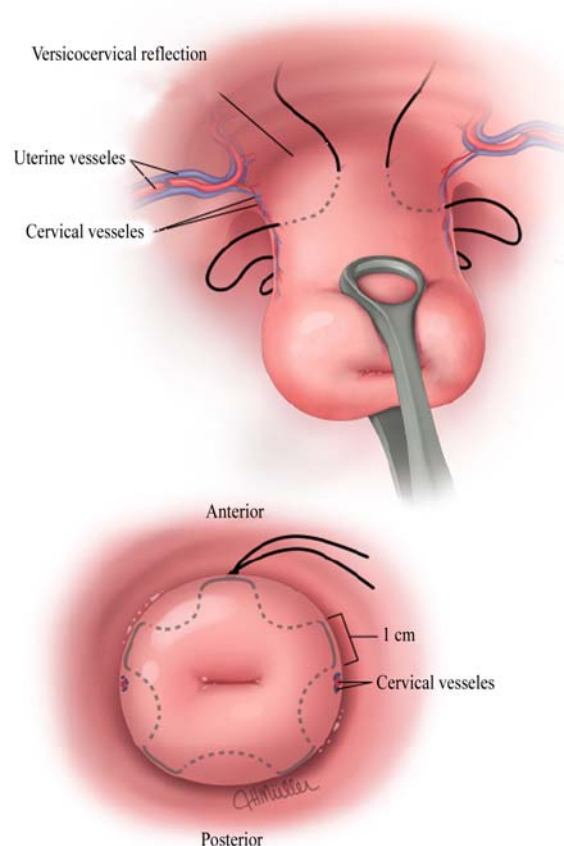
indicated cerclage should be offered to women with three or more previous preterm births and/or second-trimester losses'.<sup>5-6</sup> However, in clinical setting, cerclage is often offered with a history of one or more previous mid trimester pregnancy loss.<sup>7</sup> Cerclage is also often performed on a woman who had a previous cerclage and had a successful pregnancy thereafter. It becomes difficult for the clinician to establish that the cerclage is unnecessary in view of the possible psychological trauma to the woman. Although some literature suggests that not all women will require cerclage in their subsequent pregnancies.<sup>8</sup>

There is also limited evidence on the peri-operative management of insertion of cervical cerclage. The practice widely varies in terms of pre-operative vaginal swabs, intra-operative antibiotics, post-operative tocolytics and progesterone and post-cerclage ultrasound surveillance. We conducted 2 retrospective studies on cervical cerclage in 2 hospitals in East of England, United Kingdom. The aim of these 2 studies was to evaluate the efficacy of cervical cerclage in reducing the risk of preterm delivery and also to standardise the local practice in terms of identifying the patient group for cervical cerclage and their subsequent management and follow-up.

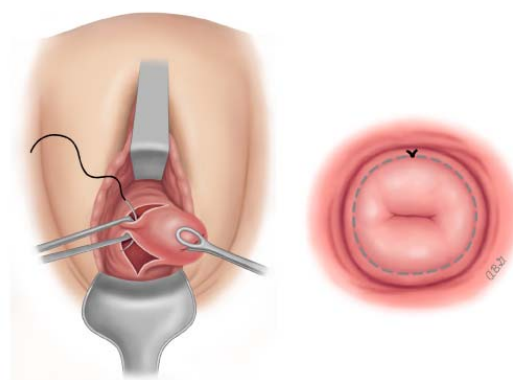
## MATERIALS AND METHODS

This was a retrospective study performed at 2 hospitals in East of England in the period from 2006 to 2012. 62 women were identified who had cervical cerclage; Hospital 1 (n=30, 2006-2011) and Hospital 2 (n=32, 2006-2012). All of these women had Mc Donald transvaginal cervical cerclage i.e. a transvaginal purse string suture was placed at the cervico-vaginal junction, without bladder mobilisation or dissection (**Figure 1** and **2**).

Indications of the cervical cerclage were reviewed. The indications based on history were one previous spontaneous mid trimester pregnancy loss with clear evidence of painless cervical dilatation in absence of bleeding, infection or ruptured membranes, previous history of cervical cerclage and history of cervical cone biopsy. Ultrasound based diagnosis of cervical insufficiency was made when the cervix length measurement was 2.5 cm with or without funneling before 24 weeks of gestation. Rescue cerclage were performed where women presented painless cervical dilatation before 24 weeks of gestation and the dilatation of cervix was less than 3 cm.



**Figure 1** (McDonald Suture)



**Figure 2** (Shirodkar Suture)

Images taken from UpToDate.com (accessed 17/05/15)

Cervical suture was removed electively at gestation age of 36-37 weeks in women who planned for vaginal delivery or at the time of caesarean section in women with planned elective caesarean section for obstetric reasons or if women were in spontaneous labor before.

The outcomes of three groups of women were compared that had cerclage based on history, ultrasound and rescue cerclage in year 2006 – 2012. The pregnancy and perinatal outcomes were analysed. Descriptive statistics of the maternal and neonatal outcomes are outlined.

## RESULTS

**Table 1** describes the demographics of the population studied.

**Table 1** Demographics of the population

Age (years)	31.9 (19-40) +/- 5.7
GA at cerclage (weeks)	14.9 (9-23) +/- 2.6
Parity	0-4
Number of Neonatal admission	7 (13%)

Of the total 62 women, 38 women (61%) had elective cervical cerclage only based on history of one or more previous mid-trimester pregnancy losses or preterm delivery, previous successful cervical cerclage or previous cervical cone biopsy. 20 women (32%) with similar history had cerclage following ultrasound surveillance where cervical length either had evidence of shortening on subsequent scan or the cervical length was 25mm with or without funneling. 4 women (6%) had rescue cerclage at 19-22 weeks and all of these women miscarried 4-10 days later. 4 women were transferred in-utero at <32 weeks following preterm premature rupture of membranes and preterm labour for tertiary neonatal care. **Table 2** describes the gestational age at which cervical suture was inserted.

**Table 2** Gestational age of cervical suture insertion

GA at cerclage insertion (Weeks)	N=62
9	1
12-14	25
>14-16	25
17-20	4
21-24	3
No Documentation	4

Most women after elective cervical cerclage stayed in the hospital for 24-48 hours (78%). However, women who had emergency cerclage (n=4, 6%) and few elective cases (3%) were kept in the hospital for more than 48 hours for clinical reasons. In 13% cases, notes could not clarify the length of stay after the cervical suture insertion.

39 (65%) women were followed up with at least 1 trans-vaginal or trans-abdominal cervical length/ reassurance

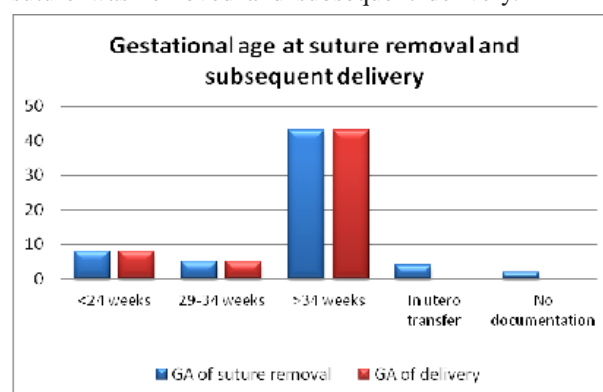
scan (**Table 3**).

**Table 3** Follow up scans of cervical length

Follow up scan	N (%)
Yes	39 (65%)
No	21 (34%)
Don't Know	2 (1%)

8 patients had cervical suture removed before 24 weeks and unfortunately had miscarriage. 5 patients had suture removed between 29 to 34 weeks and all delivered subsequently before 34 weeks. Majority of the patients (76.7%) had elective removal of sutures after 36-37 weeks and delivered subsequently. The main reasons for suture removal prior to 34 weeks were premature rupture of membrane followed by preterm labor and possible chorioamnionitis.

**Figure 1** represents the gestational age at which cervical suture was removed and subsequent delivery.



**Figure 1** Gestational age at suture removal and delivery

Out of 62 women, the number of women who had miscarriage, spontaneous vaginal delivery, caesarean section and instrumental delivery were 13% (8), 48% (30), 26% (16), 6.5% (4) respectively. 4 women were transferred in- utero to the tertiary centers.

Of 54 women with ongoing pregnancies, 45 babies (83%) were born with Apgar score of 8 or more at 1 and 5 minutes. 4 babies were born with Apgar score of less than 6 at 1 minute. Baby details were not available for those 4 patients who had in-utero transfer and were not recorded in 1 case. 7 babies were admitted in NICU due to prematurity.

This study also looked at the local policies and protocols for use of post cerclage tocolytics, vaginal swabs, use of



antibiotics and progesterone. It was observed that these practices varied between the hospitals and even within the trust varied from consultant to consultant (**Table 4**).

**Table 4** Local practice of peri-operative management

N=62 (%)	Tocolysis	Progesterone	Vaginal swab	Antibiotics
Yes	25 (40)	21 (34)	25 (40)	19 (31)
No	34 (55)	38 (61)	34 (55)	40 (64)
Not known	3 (5)	3 (5)	3 (5)	3 (5)

## DISCUSSION

Prematurity is the single most important factor in determining the perinatal outcome (RCOG, 2011). McDonald in 1980 suggested that cervical insufficiency complicates 1% of the Obstetric population.<sup>9</sup> In 1998, it was suggested that cervical insufficiency is responsible for mid-trimester pregnancy loss in 8% of the patients with recurrent miscarriage.<sup>10</sup> The Cochrane review suggest that the cervical cerclage in women at risk of preterm birth 'significantly reduces the risk of preterm birth' when compared with the women who had expectant management.<sup>11</sup> Indication of cervical cerclage remains controversial. The RCOG green top guideline no.60 recommends cervical cerclage in women in cases only with three or more previous mid trimester pregnancy loss or preterm births. However, 97% women in our study had previous history of mostly 1 or 2 mid-trimester pregnancy loss with or without ultrasound evidence of shortening of cervix. Other authors also suggest considering cervical cerclage with even one mid trimester loss if cervical length is less than 25 mm on ultrasound.<sup>12</sup> Our data has shown prolongation of pregnancy beyond 34 weeks of gestation with no increased risk of caesarean section and good neonatal outcome. The guideline from the American College of Obstetricians and Gynaecologist recommends cervical cerclage in women with spontaneous preterm births before 34 weeks and with ultrasound evidence of cervical shortening less than 25 mm before 24 weeks (ACOG, 2014).

Traditionally, history indicated sutures are inserted between 12 to 14 weeks (RCOG, 2011). In our study 25 patients had their cervical cerclage during that time. Further 25 women had their sutures inserted between 14 and 16 weeks. This can be explained by the fact that most patients have their booking visit after the dating scan by 12-13 weeks. Therefore it is not unusual to have some of

the elective cerclage performed just after 14 weeks due the obvious time interval between the booking visit, result of screening test and the available theatre slots. Also, some women had ultrasound indicated cerclage, which is usually performed between 14-24 weeks (RCOG, 2011).

In terms of the gestational age of suture removal, most patients had their suture removed after 36-37 weeks and delivered subsequently at term. Mode of delivery after cerclage depends upon the obstetric indications. Caesarean section is only indicated for obstetric reasons. All 16 patients had their caesarean sections for obstetric indications.

Rescue cerclage in contrast was unsuccessful in all cases in this present data. However, a recent study has shown successful pregnancy outcome in 50% cases with a mean prolongation of the pregnancies by 7.4 weeks.<sup>13</sup> Another study has also shown an increase in the duration of the pregnancy by 13.8±4.9 weeks.<sup>14</sup> This was statistically significant to change the pregnancy from pre-viability to sufficient viability. As suggested by the studies, various factors including presence of vaginal infection and gestation of rescue cerclage (after 20 weeks) influence the outcome of the rescue cerclage. Another study showed improved outcome with modified cerclage techniques for emergency cerclage.<sup>15</sup> Clinicians should individualize the cases and consider whether it is justifiable to offer rescue cerclage to women with maternal morbidity implications. There is lack of evidence on usage of cerclage on multiple pregnancies. A recent systemic review and meta-analysis stated no significant difference in outcome between the cerclage and no cerclage group in twin pregnancies.<sup>16</sup>

In terms of the peri-operative practice for cervical cerclage, the evidence remained equivocal. Our study has shown variable practice not only amongst the 2 different hospitals in United Kingdom but also amongst the different consultants within the same hospital (**Table 4**). The guideline from ACOG stated that there is no evidence that antibiotics or prophylactic tocolytics improve the efficacy of cerclage (level B recommendation). There is insufficient evidence to recommend vaginal swab pre-operatively. However, any infection diagnosed should be treated prior to the cervical cerclage.<sup>5</sup> The recent evidence does not support follow up scan of the cervical length after cerclage (ACOG, 2014). Our local practice has been inconsistent in this aspect due to lack of strong evidence previously.

The strength of our study was that it is a study involving 62 patients over a period of 7 years. All patients who had cervical cerclage were included in this study to exclude bias.

## CONCLUSION

Cervical cerclage does appear to prolong pregnancy in high-risk women; however small numbers limited our study. The controversy remains in the safety and effectiveness of the procedure based only on history of 1 or 2 mid trimester miscarriage or pregnancy loss. Although there is consistent report of reduction in 20% of preterm births with cervical cerclage in all the studies, there was no improvement in the perinatal mortality or morbidity and there was increased incidence of maternal morbidity in terms of pyrexia, vaginal discharge and bleeding in women who had cervical cerclage.<sup>11</sup>

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SP conceived and designed the study. SB prepared the first draft of the manuscript and wrote the first draft. SB collected the data. SB and SP both analyzed the data. SP has provided approval of the final version of this manuscript.

**Ethical clearance taken:** Not required

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# Comparison of Self Developed Scoring System for Managing Acute Pancreatitis with APACHE-II and Ranson's Scoring System

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## ABSTRACT

Acute pancreatitis includes a wide spectrum of disease, from one end with mild self limiting symptoms, to fulminating processes with multi-organ failure and high mortality. Early prediction of severity avoids the risk of subsequent morbidity and death. Approximately half the deaths of patients with severe acute pancreatitis occur within 2 weeks of onset. Early death is related to the development of severe and irreversible multi-organ dysfunction, whereas late death occurs in the second phase of illness that is dominated by sepsis and the consequences of multi-organ failure. Several biochemical markers, radiological imaging procedures and multiple clinical and biochemical scores have been used to assess severity and outcome of acute pancreatitis. The Acute Physiologic and Chronic Health Evaluation II (APACHE II) score is another physiologic scoring system that attempts to estimate the disease severity based on quantifying the degree of abnormality of multiple physiologic variable. The present study comprising of 100 patients suffering from acute pancreatitis was conducted to compare RANSON, APACHE II and the locally developed Scores and their correlation with outcome. The study also evaluated the diagnosis, aetiology, hospital stay, complications and death.

**Keywords:** Pancreatitis, severity scoring, APACHE-II

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## INTRODUCTION

Although conservative management is followed by early recovery in many cases, a reported 20 to 30% develop extensive pancreatic inflammation and necrosis, a systemic inflammatory response syndrome and multi-organ failure. Early assessment of severity has an important implication for management and timely intervention. However, an objective, reproducible and universally accepted measure to score the disease severity is still lacking.

Important recent advances have improved our understanding of the natural history of acute pancreatitis. Disease activity can be more accurately assessed using various clinical, biochemical, and immunologic markers, along with the several scoring systems for early assessment of severity.

In 1974, Ranson identified a series of prognostic signs for early identification of patients with severe pancreatitis. Out of these 11 objective parameters, five are measured at the time of admission and remaining six are measured within 48 hours of admission. If the number of positive RANSON signs is less than two, the mortality is generally zero, with three to five signs, mortality is increased from 10 to 20%. The mortality rate increases to 50% when there are more than seven positive RANSON signs. Ranson criteria have sensitivity from 40% to 90%.<sup>1</sup>

Glasgow score, another addition to the scores, which seems to be more precise than that of Ranson was proposed in 1978,<sup>2</sup> with a sensibility for the assessment of severe acute pancreatitis of 56%-85%.<sup>3</sup>

APACHE II scoring system was created to evaluate any

severe acute illness and has also been used to predict severe acute pancreatitis successfully. Though not specific for pancreatitis and somewhat cumbersome to use, the APACHE II system is as accurate at 24 hours as other systems at 48 hours, and is now therefore regarded as perhaps the optimal scoring system to assess the disease severity in acute pancreatitis. Twelve physiologic variables are measured- temperature, mean arterial pressure, heart rate, respiratory rate, arterial oxygen tension ( $\text{PaO}_2$ ), arterial pH, serum sodium, serum potassium, serum creatinine, hematocrit, white blood cell count and Glasgow coma scale. APACHE II score more than 8 predicts 11 to 18% mortality. Several comparative studies have been carried out between the different severity scoring systems. Most studies, but not all studies report that APACHE II score may be more accurate. In our setup, we have been using a locally developed scoring system in our patients with acute pancreatitis to categorise them. Here, we will also use the locally developed criteria in our study population and compare it with Ranson and APACHE II in predicting the severity of disease at admission.

In 1985, it was demonstrated that contrast enhanced computed tomography is able to assess the severity of acute pancreatitis.<sup>4</sup> They divided the severity of acute pancreatitis into 5 categories. In 83 patients with acute pancreatitis, they found that the mortality was nil in stages A, B and C, and reached 17% in those of grade E. The findings of left-sided or bilateral effusions on chest radiograph within 24 hours of admission were associated with a severe outcome.

SAPS II<sup>5</sup> similar to APACHE-II scoring with lesser specificity and sensitivity is also used in predicting acute severe pancreatitis. Study found that SAPS II was 66.7% sensitive and 79.1% specific.

A Clinically Based Classification System for Acute Pancreatitis which was known as Atlanta Classification was formulated in 1992 and is followed world over.

There have been few clinical studies of systemic inflammatory response syndrome (SIRS) in patients with acute pancreatitis. Presence of 2 of the following criteria is considered as severe pancreatitis:

1. Pulse >90 beats / min,
2. Respirations >20 per min, or  $\text{PaCO}_2 < 32$  mm Hg,
3. Temperature >100.4 ° F or < 96.8 ° F ,
4. White blood cell count >12,000 or < 4,000 cells per mm<sup>3</sup> or >10% immature neutrophils.

Various studies<sup>6</sup> concluded that persistent SIRS is associated with MODS and death in patients with acute pancreatitis and is an early indicator of the likely severity.

Bedside index for severity in acute pancreatitis (BISAP) score was evaluated among 397 consecutive cases of acute pancreatitis admitted to hospitals of Pennsylvania between June 2005 and December 2007.<sup>7, 8</sup> BISAP scores were calculated on all cases using data within 24 hours of presentation.

#### **BISAP score is comprised of 5 variables:**

1. blood urea nitrogen >25 mg / dl,
2. impaired mental status,
3. systemic inflammatory response syndrome,
4. age >60 years,
5. Pleural effusion detected on imaging.

HAP score, is another scoring system to grade the severity of Acute pancreatitis. New Japanese Severity Score (JSS) or SPS (simple scoring system) is another scoring system that includes 9 components and a score of 3 or more indicates SAP.<sup>9, 10</sup>

The Panc 3 score (hematocrit-44; BMI-30 kg/m<sup>2</sup>; and pleural effusion on x-ray) is another recently developed severity assessment tool, in which presence of all 3 components was found to predict severity with a post-test likelihood of 99%.<sup>11</sup> Pancreatitis Outcome Prediction (POP) Score was developed by retrospectively analysing data.<sup>12</sup>

Some of the recently described individual markers of severity in AP include urinary trypsinogen activation peptide (TAP)<sup>13</sup>, procalcitonin (cut-off more than 3.8 ng/mL)<sup>14</sup>, coagulation parameters (anti-thrombin III)<sup>15</sup> interleukin-6,<sup>16</sup> intra-abdominal hypertension (15 mm Hg),<sup>13</sup> and immunoparalysis (reduced HLA-DR expression).<sup>13</sup> TAP and procalcitonin are about to be available in a commercial kit form.

The utility of artificial neural networks (ANNs)<sup>17</sup> to predict severity of AP has been frequently studied in recent years. ANN is a nonlinear pattern recognition technique that contains a set of processing units that simulate human neurons so that it can learn from the data presented, thereby improvising their predictive capability. In a recent systematic review of 11 studies, ANN was found to predict prolonged hospital stay with 75% sensitivity and was comparable to APACHE II and Ranson score.<sup>18</sup>



**LOCAL SCORING:** As detailed in the next chapter, presence of three or more observations at the time of admission is defined as severe disease.

## MATERIALS AND METHODS

The prospective study was carried out from 1<sup>st</sup> August 2011 to 31<sup>st</sup> July 2012 at the GMCH among the patients

admitted with acute pancreatitis. These patients were evaluated in the light of Ranson's, APACHE-II as well as the Local scoring to understand their severity and treat them accordingly. The experience gained, is presented in this present work

APACHE-II was scored according to the following chart (Table 1):

Table 1

Physiologic Variable	High Abnormal Range					Low Abnormal Range			
	+4	+3	+2	+1	0	+1	+2	+3	+4
Temperature - rectal (°C)	≥41°	39 to 40.9°		38.5 to 38.9°	36 to 38.4°	34 to 35.9°	32 to 33.9°	30 to 31.9°	≤29.9°
Mean Arterial Pressure - mm Hg	≥160	130 to 159	110 to 129		70 to 109		50 to 69		≤49
Heart Rate (ventricular response)	≥180	140 to 179	110 to 139		70 to 109		55 to 69	40 to 54	≤39
Respiratory Rate (non-ventilated or ventilated)	≥50	35 to 49		25 to 34	12 to 24	10 to 11	6 to 9		≤5
Oxygenation: A-aDO <sub>2</sub> or PaO <sub>2</sub> (mm Hg) a. FIO <sub>2</sub> ≥0.5 record A-aDO <sub>2</sub> b. FIO <sub>2</sub> <0.5 record PaO <sub>2</sub>	≥500	350 to 499	200 to 349		<200  PO <sub>2</sub> >70	  PO <sub>2</sub> 61 to 70		  PO <sub>2</sub> 55 to 60	  PO <sub>2</sub> <55
Arterial pH (preferred)	≥7.7	7.6 to 7.69		7.5 to 7.59	7.33 to 7.49		7.25 to 7.32	7.15 to 7.24	<7.15
Serum HCO <sub>3</sub> (venous mEq/l) (not preferred, but may use if no ABGs)	≥52	41 to 51.9		32 to 40.9	22 to 31.9		18 to 21.9	15 to 17.9	<15
Serum Sodium (mEq/l)	≥180	160 to 179	155 to 159	150 to 154	130 to 149		120 to 129	111 to 119	≤110
Serum Potassium (mEq/l)	≥7	6 to 6.9		5.5 to 5.9	3.5 to 5.4	3 to 3.4	2.5 to 2.9		<2.5
Serum Creatinine (mg/dl) Double point score for acute renal failure	≥3.5	2 to 3.4	1.5 to 1.9		0.6 to 1.4		<0.6		
Hematocrit (%)	≥60		50 to 59.9	46 to 49.9	30 to 45.9		20 to 29.9		<20
White Blood Count (total/mm <sup>3</sup> ) (in 1000s)	≥40		20 to 39.9	15 to 19.9	3 to 14.9		1 to 2.9		<1
Glasgow Coma Score (GCS) Score = 15 minus actual GCS									
A. Total Acute Physiology Score (sum of 12 above points)									
B. Age points (years) <44=0; 45 to 54=2; 55 to 64=3; 65 to 74=5; ≥75=6									
C. Chronic Health Points (see below)									
Total APACHE II Score (add together the points from A+B+C)									

**LOCAL SCORING:** The following observations are taken into consideration. Presence of three or more observations at the time of admission is defined as severe disease.

1. Age <12 yrs ->50 yrs
2. Male- sex
3. Biliary- less severe (-1)
4. Alcohol intake>180 ml>day
5. Presence of dehydration
6. WBC>12000/cumm
7. Signs of sepsis<48hrs
8. Multiple organ dysfunction
9. Co-existing diseases (Co-morbid)
10. Amylase >4fold rise
11. Lipase >1000
12. CRP>4 fold rise
13. Calcium < 7mg/dl
14. Sodium>150mEq/L
15. Potassium < 3mEq/L
  - < 3- Mild disease
  - ≥ 3- Severe disease

## RESULTS

**Age distribution:** Age of the patients ranges from 15 years to 67 years. The mean age of incidence is 36.6 years as shown in **Table 1**.

**Table 1** Age wise distribution of cases

Age Group	No (s) of patients	Percentage
<20yrs	9	9%
21-30yrs	30	30%
31-40yrs	30	30%
41-50yrs	19	16%
51-60yrs	12	12%
61yrs>	3	3%

**Sex incidence:** The male and female ratio was 70:30.

## DIAGNOSIS

Patients were diagnosed as cases of acute pancreatitis on the basis of clinical features and ultrasonographical and biochemical evidence.

## Etiology

**Biliary pancreatitis:** 35 patients had gall stone disease. Out of these 35 patients, 21 patients were female and 14 male patients. 3 patients of which 1 was male and 2 female had choledocholithiasis in addition to gall stone. 1 female patient had only CBD stone and no gall stone. 2 patients used alcohol on a regular basis.

**Alcohol intake:** 43 patients took alcohol on a regular basis out of which 42 were male and 1 female patient. 2 alcoholic patients also had gallbladder stones.

**Other etiologies:** In 16 patients no cause of acute pancreatitis could be determined and were labelled as idiopathic AP

**Co-Morbidities:** 14 patients had additional co-morbidities among which Diabetes Mellitus (35.7%) was the most common. Co-morbidities are considered significant in APACHE II, but not in RANSON'S criteria.

**Ranson's Criteria:** Patients with RANSON score more than or equal to 3 were considered severe. 58 patients were considered mild of which 14 patients were female and 44 patients were male.

The average hospital stay of the patients with mild pancreatitis was approximately 6.8 days. There was no death in the mild category. No patient of the mild category required ICU care. 42 patients were considered severe out of which 16 were female patients and 26 were male patients.

The average RANSON score of the severe patients was 4. The average hospital stay of the severe patients was 13.7 days. 12(27.2%) patients required ICU care. 3(6.8%) patients died. Among the 42 severe patients 18 patients had gall stones and 14 patients were alcoholic.

**APACHE II SCORE:** The average APACHE II score of the patients was 4.17. 79 patients had mild disease and 21 had severe disease when APACHE II score was used. Out of the 79 mild patients 26 were female and 53 were male.

The average APACHE II SCORE of the mild patients was 2.2 for which the average hospital stay was 7.9 days. No death occurred among the patients from mild category. Out of the 21 severe cases, 4 were female and 17 were male.

The average APACHE II score of the severe patients was 11.2. Average hospital stay of the patients was 17 days. 11(52%) patients from the severe group required ICU care. 3(14.2%) patients died. 16(76%) of the patients developed either local or systemic complication.

**LOCAL SCORE:** As per the local score, 40 patients had mild disease and 60 had severe disease. Out of 40 mild patients, 28 were male and 12 were female. 12 patients had gallstones, 17 patients were alcoholic and 11 patients had other causes of disease (**Table 2**).

**Table 2** Distribution of cases as per the local score

Etiology	Numbers	Percentage
Gall Stones	12	30.0%
Alcohol	17	42.5%
Others	11	27.5%

The average hospital stay of the patients with mild disease was 6 days. No patient with mild disease required ICU care. 3 patients developed pseudocyst of pancreas. There was no death in the mild category.

Out of the 60 severe patients 42 patients were male and 18 patients were female. 23 patients had gall stones, 26 patients were alcoholic and 11 cases had other causes of disease.

The average hospital stay of the patients with severe disease was 12.5 days. 12 (20%) patients needed ICU care. 3(5%) patients died. 19(31.6%) had developed complications. The scoring wise mortality predictor is as follows.

RANSON SCORE	0-3- no mortality $\geq 3$ –6.8% mortality
APACHE II SCORE	<8- no mortality $\geq 8$ - 14.3% mortality
LOCAL SCORE	Mild- no mortality Severe- 5%

#### COMPARISON BETWEEN RANSON, APACHE II AND LOCAL SCORE IN PREDICTING SEVERITY

The sensitivity of RANSON'S scoring system was 81.8% and 66.7% specificity in predicting severe acute pancreatitis. The positive predictive value (PPV) of RANSON'S score was 40% , while negative predictive value (NPV) was 89%.

The APACHE II scoring system had a sensitivity of 72.7% and specificity of 93.4%. The PPV was 76.2% and NPV was 89.8%.

The LOCAL scoring system had sensitivity of 86.3% while specificity of only 47%. The PPV of the scoring system was 31.7% and NPV was 92.5%.

The LOCAL score with 86.3% had the highest sensitivity in the study. APACHE II scoring system with 93.4% had the highest specificity. It also had the highest PPV (76.2%). While RANSON'S and APACHE II scored similar in NPV the LOCAL score had the highest with 92.5%.The high negative predictive value (NPV) allows this score to exclude severe AP outcome.

There was significant correlation between disease severity and RANSON'S score  $\geq 3$  with ODDs ratio of 9.0, confidence interval of 95% between 2.7619 to 29.3273 and p value .0003.

Significant correlation between disease severity and APACHE II score was found with ODDs ratio 28.4, 95% CI 8.2016 to 98.3424 and p value 0.0001.

The LOCAL score had significant correlation with disease severity with ODDs ratio of 5.71, 95% CI 1.5635 to 20.8930 and p value 0.008 (**Table 3**).

**Table 3** Comparison between Scoring Systems and their Correlation with Severity, Mortality, Complications and Hospital Stay

Score	Severity	Mortality	Complication	Hospital Stay
RANSON	Odds ratio 9.0 (2.7619 to 29.3273) p- 0.0003	p-0.09	p- <0.02	6v/s 13days p- <0.0001
APACHE II	Odds ratio 28.4(8.2016 to 98.3424) p- 0.0001	p-0.014	p~0.1	7 v/s 17 days p- <0.0001
LOCAL SCORE	Odds ratio 5.71 (1.5635 to 20.8930) p-0.008	p-0.22	p-<0.01	5v/s 11days p- <0.0001

#### DISCUSSION

On the basis of data on patients in United States, Asia and Western Europe and from various studies<sup>9, 20</sup> it was seen that gallstones are the most common cause of acute

pancreatitis, accounting for approximately 45% of cases. Alcohol accounts for 35% of the cases being the second most common cause. Some investigators from United Kingdom<sup>21, 22</sup> and Asia<sup>23</sup> have reported gallstones in approximately two thirds of their patients, whereas some centres in United States have reported alcoholism as the predominant cause in two thirds to three quarters of patients.

The cause of AP cannot be established in 2% to 40% patients<sup>24, 25, 26</sup> and termed as idiopathic pancreatitis. In most patients with acute pancreatitis, the cause can be established on the basis of initial history, physical examination, laboratory studies, and abdominal sonography. Patients with unexplained pancreatitis at that point are often considered to have idiopathic disease. However, a cause and, often, effective treatment to prevent recurrent pancreatitis are possible in many of these patients if an aggressive diagnostic approach is taken to discover undiagnosed hyperlipidemia, occult gallstones, abnormalities of the bile and pancreatic ducts, sphincter of Oddi dysfunction, pancreatic cancer and other tumors, and cystic fibrosis (in children and young adults)<sup>27</sup> The factors influencing morbidity and mortality in acute pancreatitis in 279 cases were studied.<sup>28, 29</sup> Study revealed- Mortality in gall stone related pancreatitis was 3% compared with 15% ( $p = 0.03$ ) in pancreatitis of unknown aetiology and 27% ( $p = 0.01$ ) in post-endoscopic retrograde cholangiopancreatography pancreatitis. Mortality was related to age (mortality > 55 years old 11% v 2%;  $p = 0.003$ ).

## CONCLUSION

It was concluded that mortality in acute pancreatitis is influenced by age, aetiology of the disease and presence of organ failure.

In our study APACHE II score was found to be better predictor of survivability with good sensitivity and high specificity in predicting disease severity. Even correlation was seen between mortality and APACHE II score. APACHE II score more than 8 was associated with severe disease, longer hospital stay and mortality. However, no association was seen between APACHE II score and complications. But association between Ranson's score and Local score was appreciable. Both had more sensitivity, but were less specific in predicting severe disease and no association were seen with mortality. The high negative predictive value of local score allows the score to exclude severe acute pancreatitis. The patients

from the mild group of local scoring are less likely to have severe disease than the patients from the mild group of other two scoring systems (Ranson and APACHE II).

**Conflict of interest:** None

**Ethical clearance:** Taken

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## Academic Excellence of Member of International Advisory Board of IJHRMLP

**Prof. Dalbir Singh** MBBS MD, Chandigarh has received life time achievement award in ICFMT conference held at Gurgaon, SGT Medical College, November, 2015.



## Software Tool in Digital Radiographs for Appearance and Fusion of Ossification Centres at Wrist Joint

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### ABSTRACT

*Radiographic study of long bones is hoar method for age estimation. Many studies have been carried out in the world using conventional radiographs but a very few using digital radiographs. Age of appearance and fusion of ossification centres show considerable variations due to factors like race, habitat, nutrition and the methods by which databases are prepared. So, it is the need of the hour that some local databases are made available for more precise age estimation in medicolegal cases. Present study was carried out by observing digital radiographs of wrist with incorporation of software tool Microsoft Office Picture Manager. Exhaustive statistical tests were applied to analyse the findings and an institutional database was created. Findings of present study are in consonance with other studies or in some cases, it detects appearance and fusion of ossification centres earlier than other studies. Digital images of radiographs with incorporation of software tool Microsoft Office Picture Manager yielding better visualisation and resultant better interpretation proved out to be useful. Such institutional databases can be formed at individual hospitals to cater to medico legal services of age estimation more precisely and thus acceptance of the opinions regarding age estimation by the court of law can be increased.*

**Keywords:** Age estimation, wrist joint, ossification centre, digital radiographs, software tool

### INTRODUCTION

Age is one of the very important criteria for identification. Question of age estimation arises in various civil as well as criminal cases like consent for physical examination, employment in government sectors, criminal responsibility of an accused, rape, kidnapping, etc. Age estimation of the living as well as of cadavers relies heavily on data, regarding growth and developmental stages of the individual as obtained from dental and skeletal radiographs.<sup>1</sup> The most widely accepted method for determining skeletal bone age is that of Greulich-Pyle<sup>2</sup> described in the book “*Radiographic atlas of skeletal development of the hands and wrist*”. The atlas was derived from the American white children of upper class socio-economic level born during 1930s. Since then, a lot of studies have been carried out on estimation of age from radiological examination of epiphyseal fusion of bones. Whilst the time of these epiphyseal fusions is relatively well documented, it can show a considerable degree of person to person variation. It may depend on multiple factors like genetic makeup, race, geographical habitat and dietary habits, etc.<sup>1,3-5</sup> For this reason, a baseline data for a particular geographical population is

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required for comparison. Therefore the authors have carried out this study on the patients coming to GCS Medical College for routine check-up and living in Ahmedabad city since their birth.

## OBJECTIVES

1. To observe average age of appearance of ossification centre at lower end of radius and ulna in digital radiographs by incorporating software tool.
2. To observe average age of epiphyseal fusion at lower end of radius and ulna in digital radiographs by incorporating software tool.
3. To compare findings of present study with other different studies.
4. To look for scientific explanation for variations; if any.
5. To evaluate medico legal application of observations in exercise of age estimation.

## MATERIALS AND METHODS

A retrospective cross-sectional study was carried out on digital radiographs of wrist and hand collected in OPDs at GCS Medical College, Hospital and Research centre for clinical (Non research) purposes during 1-1-12 to 31-12-12.

### Inclusion criteria:

- Subjects of known gender and age living in Ahmedabad since birth.

### Exclusion criteria:

- Subjects with undefined gender and age in question or doubt.
- Subjects with history of trauma or diagnosed disease or pathology at wrist and/or hand.
- Subjects with congenital abnormality.

Out of 600 cases of X-ray examination at wrist joint during the period; 140 cases were excluded as per defined exclusion criteria and rest 460 cases were included in the study.

After blinding, the radiographs were studied in digital form in "JPEG format" in Microsoft Office Picture Manager 2007 version in 2505x3015 resolution with 60% zoom in.

For distal end of radius and ulna, appearance of the

ossification centre was considered as "A". Radiographs showing

- Clear gap between the epiphysis and diaphysis, showing saw tooth like appearance were designated as "Non-fusion" (NF).
- A line replacing the hiatus between the epiphyseal and diaphyseal ends and not showing saw tooth like appearance were designated as "Partial Fusion" (PF).
- Same bony architecture in the diaphysis and epiphysis and showing scar of the previous stage were designated as "Recent Fusion" (RF).
- Uniform architecture at the union site with absence of any scar were designated as "Complete fusion" (CF).<sup>6</sup>

The data was tabulated and analysed further to deduce observations and discussion.

## OBSERVATIONS and RESULTS

Out of total 460 cases; 198 were below 23 years of age amongst which 148 were males and 50 were females. All the data in tabulated form are self explanatory without any text commentary further.

**Table 1** Frequency distribution of ossification centre appearance of lower end of Radius and Ulna

Age group (yrs)	Total number of cases in age group	Lower end Radius No.(%)	Lower end Ulna No.(%)
0-1	6	0	0
1-2	10	8 (80)	0
2-3	16	8 (50)	0
3-4	8	8 (100)	0
4-5	8	8 (100)	0
5-6	4	4 (100)	0
6-7	4	4 (100)	0
7-8	4	4 (100)	0
8-9	8	8 (100)	6 (75)
9-10	8	8 (100)	4 (50)
10-11	10	10 (100)	10 (100)
11-12	6	6 (100)	6 (100)
12-13	4	4 (100)	4 (100)
13-14	4	4 (100)	4 (100)
>14	360	360 (100)	360 (100)
<b>Total</b>	<b>460</b>		

**Table 2** Statistical parameters for appearance of ossification centre at lower end of Radius and lower end of Ulna

Statistical parameter	Lower end Radius (n=34)	Lower end Ulna (n=26)
Range	1-4	8-11
Mean Age	1.94	9.08
SD	0.74	0.84
Mean $\pm$ 3SD	-0.28 to 4.16	6.56 to 11.6
Co-efficient of Variance (SD/Mean)	0.38	0.09
% Beyond demarking point	0	0

**Table 3** Frequency distribution of stage wise epiphyseal fusion of lower end of Radius in both sexes

Age group (years)	Sex (M-Male, F-Female)	Non fusion (NF) No.(%)	Partial fusion (PF) No.(%)	Recent fusion (RF) No.(%)	Complete fusion (CF) No.(%)	Total
<14	M	76 (100)	0	0	0	76
	F	24 (100)	0	0	0	24
14-15	M	6 (100)	0	0	0	6
	F	2 (100)	0	0	0	2
15-16	M	4 (33.33)	8 (66.66)	0	0	12
	F	0	2 (50)	2 (50)	0	4
16-17	M	0	0	0	0	0
	F	0	4 (100)	0	0	4
17-18	M	0	6 (75)	2 (25)	0	8
	F	0	0	2 (100)	0	2
18-19	M	0	4 (25)	10 (62.5)	2 (12.5)	16
	F	0	0	0	0	0
19-20	M	0	0	2 (33.33)	4 (66.66)	6
	F	0	0	2 (50)	2 (50)	4
20-21	M	0	0	2 (25)	6 (75)	8
	F	0	0	0	2 (100)	2
21-22	M	0	0	2 (25)	6 (75)	8
	F	0	0	0	4 (100)	4
22-23	M	0	0	0	8 (100)	8
	F	0	0	0	4 (100)	4
>23	M	0	0	0	136 (100)	136
	F	0	0	0	126 (100)	126
<b>Total</b>	<b>M</b>					<b>284</b>
	<b>F</b>					<b>176</b>
	<b>Total</b>					<b>460</b>



**Table 4** Frequency distribution of stage wise epiphyseal fusion of lower end of Ulna in both sexes

Age group (years)	Sex (M-Male, F-Female)	Non fusion (NF) No. (%)	Partial fusion (PF) No.(%)	Recent fusion (RF) No. (%)	Complete fusion (CF) No.(%)	Total
<14	M	76 (100)	0	0	0	76
	F	24 (100)	0	0	0	24
14-15	M	6 (100)	0	0	0	6
	F	2 (100)	0	0	0	2
15-16	M	6 (50)	6 (50)	0	0	12
	F	0	2 (50)	0	2 (50)	4
16-17	M	0	0	0	0	0
	F	0	0	4 (100)	0	4
17-18	M	2 (25)	4 (50)	0	2 (25)	8
	F	0	0	0	2 (100)	2
18-19	M	0	2 (12.5)	8 (50)	6 (37.5)	16
	F	0	0	0	0	0
19-20	M	0	0	0	6 (100)	6
	F	0	0	0	4 (100)	4
20-21	M	0	0	0	8 (100)	8
	F	0	0	0	2 (100)	2
>21	M	0	0	0	152 (100)	152
	F	0	0	0	134 (100)	134
<b>Total</b>	<b>M</b>					<b>284</b>
	<b>F</b>					<b>176</b>
	<b>Total</b>					<b>460</b>

**Table 5** Statistical parameters for sexual dimorphism of epiphyseal fusion at lower end of Radius and Ulna

Statistical parameter	Lower end Radius		Lower end Ulna	
	Male (n=62)	Female (n=16 )	Male (n=34)	Female (n=10)
Range	15-23	15-21	15-20	15-18
Mean	18.74	17.12	17.47	15.8
SD	2.15	1.89	1.30	0.79
Mean $\pm$ 3SD	12.29-25.19	11.45-22.79	13.57 – 21.37	13.43 – 18.17
Co-efficient of variance (SD/Mean)	0.11	0.11	0.07	0.05
Demarcating point	>22.79	<12.29	> 18.17	< 13.57
% beyond demarcating point	0	0	6 (17.64%)	0
	't' value = 2.749, 'p' value = 0.0075		't' value = 3.840, 'p' value = 0.0004	

**Table 6** Regression equations for epiphyseal fusion of lower end of Radius and Ulna in both sexes

Variable	Regression equation	Standard Error	Coefficient of Correlation
<b>Lower end Radius</b>			
Common (Both sexes)	$Y = 10.03 + 3.73 (X)$	2.72	0.87
Male	$Y = 10.52 + 3.56 (X)$	2.57	0.87
Female	$Y = 7.81 + 4.51 (X)$	3.22	0.85
<b>Lower end Ulna</b>			
Common (Both sexes)	$Y = 13.70 + 1.55 (X)$	1.48	0.79
Male	$Y = 13.66 + 1.73 (X)$	1.48	0.82
Female	$Y = 14.29 + 0.66 (X)$	0.71	0.73

## DISCUSSION

Radiographic study of shoulder, elbow, wrist, hip, knee and ankle regions is a known method for age estimation. Many studies have been carried out in past in various regions of the world using conventional radiographs<sup>4, 6-14</sup> but research with digital radiographs of hip joint was first reported in biomedical literatures of India in 2012 only.<sup>15</sup>

Appearance of ossification centre for lower end of radius in present study occurs at 1½-2½ years which is in consonance with the studies done on population of central India (1-3 years) by Pawan Wankhede et al<sup>14</sup> and Rajasthan (1-3 years) by Ashutosh Srivastava et al.<sup>8</sup> Studies done on population of England (10-12 months) by Davies and Pearson<sup>4</sup>, Bengal (1 year) by Galstaun<sup>4</sup> mention appearance of lower end of radius earlier than present study. Ossification centre for lower end of ulna appears at the age of 8½- 9½ years in present study which is in consonance with study done on Bengalis (8-10 years) by Galstaun.<sup>4</sup> Other studies showing appearance of lower end of ulna earlier than present study are studies done on population of England (7-8 years) by Davies and Pearson<sup>4</sup>, Rajasthan (5-8 years) by Ashutosh Srivastava et al<sup>8</sup> and Central India (6-8 years) by Pawan Wankhede et al.<sup>14</sup> We could not find any data showing appearance of ossification centre of lower end of radius or lower end of ulna later than the present study in literature available with us.

**Table 3** shows earliest fusion of lower end of radius at age of 15 years in both sexes where, in males 66.66% cases show partial fusion but 33.33% cases still show

non-fusion; while at the same age in females, no case shows non-fusion but partial fusion is shown by 50% cases and recent fusion by 50% cases, indicating that fusion process of lower end of radius starts earlier in females than males. Looking at the completion of fusion process, 100% cases in females show complete fusion at the age of 21 years but in males complete fusion in 100% cases is seen at 23 years which suggests that completion of fusion process of lower end of radius also occurs earlier in females than males. This is supported by information given in standard textbooks of Forensic Medicine.

According to **Table 4**, earliest fusion of lower end of ulna is seen at the age of 15 years in both sexes where, in males 50% cases show partial fusion but 50% cases still show non-fusion; while at the same age in females, no case show non-fusion but partial fusion is shown by 50% cases and complete fusion by 50% cases, indicating that fusion process of lower end of ulna starts earlier in females than males. Looking at the completion of fusion process, 100% cases in females show complete fusion at the age of 18 years but in males complete fusion in 100% cases is seen at the age of 20 years which suggests that completion of fusion process of lower end of ulna also occurs earlier in females than males. This is supported by information given in standard textbooks of Forensic Medicine.

Age of fusion of lower end of radius in males in present study (18-19 yrs) is in consonance with study done on population of America done by Greulich and Pyle<sup>2</sup>, Australians by Flecker<sup>4</sup>, Central Karnataka by Kadam SS et al<sup>10</sup> and Rajasthani population by Kothari DR et al<sup>9</sup>. Lower end of radius in males fuses earlier than present study according to studies done on population of Bengal (16-17 years) by Galstaun<sup>4</sup> and North Karnataka (17-18 years) by Patil DT et al.<sup>10</sup> Fusion of lower end of radius occurs later than the present study according to the other studies done on English population (19-20 years) by Davis and Pearson<sup>4</sup>, Rajasthani population (19-20 years) by Jain S et al<sup>10</sup> and population of Himachal Pradesh (21 years) by Sankhyan S et al.<sup>10</sup>

Age of fusion of lower end of radius in females in present study (16½-17½ years) is in consonance with studies on population of America done by Greulich and Pyle<sup>2</sup>, Bengalis (16½ years) by Galstaun<sup>4</sup>, Central India (16-17 years) by Pawan Wankhede et al<sup>14</sup>, Central Karnataka (16-17 years) by Kadam SS et al<sup>10</sup> and North Karnataka by

Patil DT et al.<sup>10</sup> Lower end of radius in females fuses at age of 17-18 years in Maharashtrians according to Kangne RN et al<sup>11</sup> and Rajasthanis according to Kothari DR et al<sup>9</sup>, at 18 years in North-east Indian population according to Sangma WBCh et al<sup>12</sup> and Australian females as per Flecker<sup>4</sup>, at 18-19 years in population of Madhya Pradesh according to Saksena JS et al<sup>9</sup> and at age of 19-20 years in Rajasthani population according to Jain S et al<sup>10</sup>, which comes out to occur later than the present study. We could not find data showing fusion of lower end of radius in females earlier than present study in literature available with us.

Lower end of ulna in males in present study gets fused at the age of 17-18 years which is in consonance with other studies done on Bengalis by Galstaun<sup>4</sup> and on North Karnataka population by Patil DT et al.<sup>10</sup> The fusion of lower end of ulna in males in present study occurs earlier compared to other studies on population of England (20 years) by Davies and Parson<sup>4</sup>, Australia (18 years) by Flecker<sup>4</sup>, America (19 years) by Greulich and Pyle<sup>2</sup>, Rajasthan (18-19 years) by Kothari DR et al<sup>9</sup>, Central Karnataka (18-19 years) by Kadam SS et al<sup>10</sup>, Rajasthan (19-20 years) by Jain S et al<sup>10</sup>, Madhya Pradesh (20-21 years) by Saksena JS et al<sup>9</sup> and Himachal Pradesh (21 years) by Sankhyan.<sup>10</sup> We could not find data showing fusion of lower end of ulna in males earlier than present study in literature available with us.

Lower end of ulna in females in present study gets fused at the age of 15½ -16½ years which is in consonance with other studies done on Bengalis by Galstaun<sup>4</sup> and Central Karnataka population by Kadam SS et al.<sup>10</sup> The fusion of lower end of ulna in females in present study occurs earlier than other studies on population of Australia (17 years) by Flecker<sup>4</sup>, America (17 years) by Greulich and Pyle<sup>2</sup>, Maharashtra (16-17 years) by Kangne RN et al<sup>11</sup>, Central India (16-17 years) by Pawan Wankhede et al<sup>14</sup>, Rajasthan (17-18 years) by Kothari DR et al<sup>10</sup>, Rajasthan (18-19 years) by Jain S et al<sup>10</sup> and Madhya Pradesh (18-19 years) by Saksena JS et al.<sup>9</sup> We could not find data showing fusion of lower end of ulna in females earlier than present study in literature available with us.

Thus present study is able to detect a particular stage of fusion at the earliest compared to other studies overall. Credit can be given to the digital nature of radiographs in present study along with use of software tool Microsoft Office Picture Manager which provides more clear visualization of the radiographs resulting into better

interpretation. Variation in ages of appearance and fusion of ossification centres of lower end of radius and ulna can be explained by interclass and intraclass variations in sample size, high quality of digital images, incorporation of software tool, application of exhaustive statistical tests yielding more accurate results in addition to general factors like racial differences and different geographical distribution of the sample population with nutritional status and varying diets.

Simple regression formula for estimation of age from stage of ossification can be derived where stage of ossification acts as independent variable while age in question becomes dependent variable.<sup>12, 13</sup>

## CONCLUSION

We concluded that in the population of Ahmedabad, average age of appearance of lower end of radius & lower end of ulna is 1½ - 2½ years and 8½ - 9½ years respectively. Average age of fusion of lower end of radius is 18-19 years (in males) and 16½-17½ years (in females). Average age of fusion of lower end of ulna comes out to be 17-18 years (in males) and 15½ -16½ years (in females).

Use of digital radiographs with incorporation of the software tool Microsoft Office Picture Manager is proven more precisely. Findings of present study are more acceptable because of huge sample size, digital nature of radiographs with software tool and exhaustive statistical analyses.

## Thus, two types of opinions can be formed:

1. Age of appearance of lower end of radius: 1½ - 2½ years or 2 years  $\pm$  6 months.
2. Age of appearance of lower end of ulna: 8½ - 9½ years or 9 years  $\pm$  6 months.
3. Age of fusion of lower end of radius: **Male:** 18-19 years or 18½ years  $\pm$  6 months; **Female:** 16½-17½ or 17 years  $\pm$  6 months
4. Age of fusion of lower end of ulna: **Male:** 17-18 or 17½  $\pm$  6 months; **Female:** 15½ -16½ or 16  $\pm$  6 months (These findings have to be correlated with findings of radius if age in question is 16 years)

We suggest to the department of Forensic Medicine in each medical college to carry out such study in their hospital so that an institutional database can be created which can help in catering medico legal services related to age estimation more precisely.

**Ethical clearance:** Done

**Conflict of interest:** None declared.

**Contribution of authors:** We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. Conception and design: Mohammed Ziyaeddin G Saiyed, Chetan B Jani. Collection and analyses: Swati S Shah in addition.

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ORIGINAL PAPER

# Corneal Endothelial Cell Density and Retinal Nerve Fiber Layer Thickness in Glaucoma

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## ABSTRACT

**Purpose:** To evaluate a possible association between corneal endothelial cell density and retinal nerve fiber layer (RNFL) thickness in primary glaucoma patients.

**Methods:** All patients underwent comprehensive eye examination. Diagnosis of primary glaucoma was done according to the ISGEO criteria. Corneal endothelial count was measured by non-contact specular microscopy. The RNFL thickness was measured by time-domain optical coherence tomography (OCT). Data was analyzed using appropriate statistical methods.

**Results:** A total of 95 eyes of 50 primary open angle glaucoma (POAG) patients, 97 eyes of 50 primary angle closure glaucoma (PACG) patients and 100 eyes of 50 age matched normal subjects were examined. In all the groups, the endothelial cell density positively correlated with average RNFL thickness ( $p < 0.0001$ ) indicating direct correlation of endothelial density with RNFL. The RNFL thickness of the POAG and the PACG groups were found to significantly decrease with increasing IOP ( $p < 0.001$ ). Similarly, the endothelial cell count of the POAG and the PACG groups were found to significantly decrease with increasing IOP ( $p < 0.001$ ).

**Conclusion:** Lower endothelial cell density correlates well with thinner RNFL in both glaucomatous and normal eyes. Also, the corneal endothelial cell count and RNFL thickness in both the groups decreased proportionately with increasing IOP.

**Keywords:** Corneal endothelial cell density, correlation, intraocular pressure, primary glaucoma, retinal nerve fibre layer thickness

## INTRODUCTION

Glaucoma is a progressive optic neuropathy identified by characteristic optic disc, retinal nerve fiber layer (RNFL) and visual field damage and change that occurs as a result of retinal ganglion cell damage and death. Detecting structural and functional change is one of the most challenging aspects of glaucoma management.<sup>1-3</sup>

Reduced endothelial counts are reported in association with primary open angle glaucoma,<sup>4</sup> primary angle closure glaucoma (PACG)<sup>5-7</sup> and other forms of glaucoma's.<sup>5-7</sup> Elevated intraocular pressure likely affects the decrease of corneal endothelial cell density in eyes with glaucoma,<sup>8</sup> though the relationship between the changes in RNFL thickness and endothelial count in glaucomatous patients has not much been studied in detail.

## AIMS OF THE STUDY

We assessed if there is any association between corneal endothelial cell density and RNFL thickness in primary glaucoma patients. Moreover, we also investigated the association of corneal endothelial cell density and RNFL thickness with IOP level in primary glaucoma patients. Understanding this relationship may provide new insight

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into the role of corneal endothelial cell density in the diagnosis of primary glaucoma.

## METHODS

This case controlled, cross-sectional study which included a total of 95 eyes of 50 primary open angle glaucoma (POAG) patients and 97 eyes of 50 primary angle closure glaucoma (PACG) patients and 100 eyes of 50 normal age matched subjects from July 2013 to February 2014. The study protocol was approved by the Ethical committee, Srimanta Sankaradeva University of Health Sciences, Guwahati.

Inclusion criteria included all patients, both males and females, above 40 years of age attending the indoor and outdoor departments of the Regional Institute of Ophthalmology, Gauhati Medical College and Hospital, Guwahati, Assam.

Exclusion criteria included patients below 40yrs of age, secondary glaucoma (traumatic, tumours, uveitis, etc), any condition that will hamper visualization of corneal endothelial cells or the posterior segment (corneal scarring, cataract or any other media opacity), patients with history of contact lens use, ocular trauma, patients who had glaucoma medication history, laser treatment history, all conditions affecting endothelial cells (cataract surgery, glaucoma surgery etc), all conditions affecting RNFL(DM, high myopia, retinal disorders, posterior segment inflammations).

A detailed history of the patients was taken and the best corrected visual acuity was checked using Snellen's chart. Patients were examined using slit lamp, Goldman applanation tonometry, Susmann 4-mirror gonioscopy, ultrasonic pachymetry, Humphrey field analyzer (SITA 30-2), and direct and indirect Ophthalmoscopy and disc examination by slit lamp biomicroscopy using +90D lens. Diagnosis of primary glaucoma was done according to the ISGEO criteria. Corneal endothelial cell density was measured by specular microscopy and RNFL thickness by stratus OCT. Corneal endothelial count was measured by non-contact specular microscopy [Topcon SP3000P (TMS Oakland, NJ)]. The endothelial cell count was based on the average of two measurements with the best clarity.

The RNFL thickness was measured by time-domain optical coherence tomography OCT (Stratus OCT, Carl Zeiss Meditec, Inc., Dublin, California, USA), which has a resolution of 10 microns. Fast RNFL scan protocol was used in this study. The average of two measurements was taken with the best signal strengths.

Data was analyzed with appropriate statistical methods, using person's correlation coefficient.  $p < 0.5$  was considered significant.

## RESULTS

The study population consisted of 150 subjects belonging to the presbyopic age group and the ages ranged from 40yrs to 78yrs (mean + SD was 59+ 19 yrs). In the POAG group, the largest number (25) of patients were in the age group 60-69 years (50%), followed by 17 (34%) patients in the 70-79 yrs group, 6 (12%) patients in the 50-59 yrs age group and 2 (4%) in the age group of 40-49 yrs. In the PACG group, the largest number (27) of patients were in the age group 50-59 years (54%), followed by 12 (25%) patients in the 60-69 yrs group, 8 (16%) patients in the 70-79 yrs age group and 3 (7%) in the age group of 40-49 yrs. In the normal group, the largest number (25) of patients were in the age group 50-59 years (50%), followed by 15 (30%) patients in the 40-49 yrs group, 6 (12%) patients in the 60-69 yrs age group and 4 (8%) in the age group of 70-79 years (**Table 1**).

**Table 1** Age distribution of all primary glaucoma cases in the study population

Age group(years)	POAG	PACG	Normal
40-49	2(4%)	3(7%)	15
50-59	6(12%)	27(54%)	25
60-69	25(50%)	12(25%)	6
70-79	17(34%)	8(16%)	4

In the POAG group, there were 31 (62%) males and 19 (38%) females, in the PACG group, there were 27 (54%) males and 23 (46%) females while in the normal group, there were 26 (52%) males and 24 (48%) females.

The mean endothelial cell densities were  $2302.54 \pm 224$ ,  $2344.38 \pm 231$  and  $2482.98 \pm 235.08$  respectively among the POAG, PACG and the normal groups (**Table 2**).

**Table 2** Corneal endothelial cell density among POAG, PACG and Normal

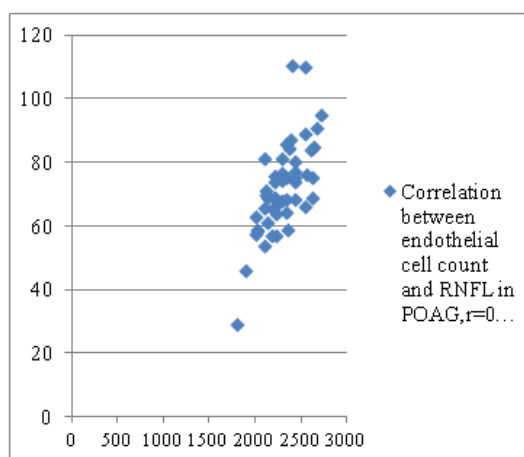
	POAG	PACG	Normal
No. of eyes	95	97	100
Mean density	2302.54	2344.38	2482.98
SD	210.02	235.08	220.29
Min density	1809	1986	2009
Max density	2722	3202	2923

The mean RNFL thickness were  $72.13 \pm 19.79\mu$ ,  $75.17 \pm 20.64\mu$  and  $92.55 \pm 14.99\mu$  respectively among the POAG, PACG and the normal groups (**Table 3**).

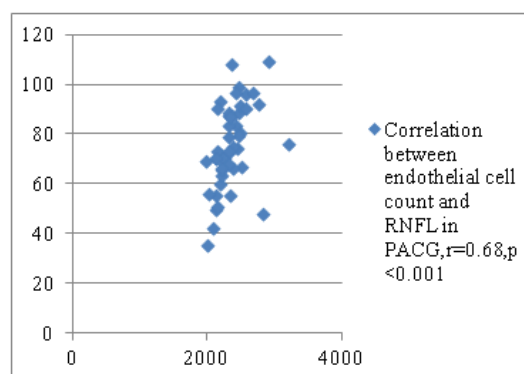
**Table 3** Showing average RNFL thickness in POAG, PACG and Normal

	POAG	PACG	Normal
No of eyes	95	97	100
Mean avg RNFL ( $\mu$ )	72.13	75.17	92.55
SD	14.24	16.49	17.28
Min avg RNFL ( $\mu$ )	29.12	35.32	65.15
Max avg RNFL ( $\mu$ )	110.45	109	140.92

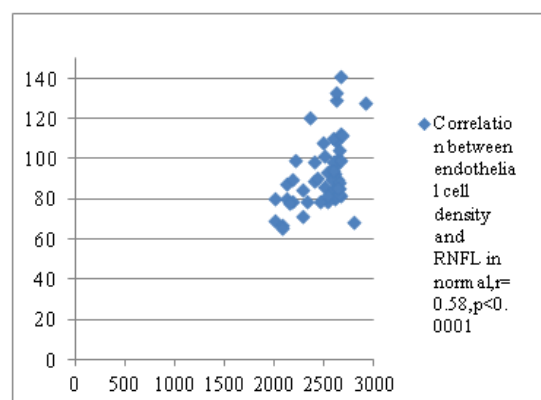
In our study, we found that in all the groups, i.e., POAG, PACG and normal, the mean endothelial cell density positively correlated with average RNFL thickness [Pearson's correlation coefficient,  $r=0.55$ ,  $0.68$  and  $0.58$ , ( $p<0.5$ ) respectively] (**Figure 1, 2 and 3**).



**Figure 1** Correlation between corneal endothelial cell count and RNFL thickness in POAG cases



**Figure 2** Correlation between corneal endothelial cell density and RNFL thickness in PACG cases



**Figure 3** Correlation between corneal endothelial cell density and RNFL thickness among normal population

The difference of the mean IOP of the POAG and PACG groups with the normal subjects was found to be statistically significant [ $t=16.31$ ,  $p<0.001$  and  $t=15.13$ ,  $p<0.001$ ] respectively]. Moreover, the difference of the mean IOP between the POAG and PACG group was also found to be statistically significant ( $t=4.8$ ,  $p<0.001$ ) (**Table 4**).

**Table 4** Mean IOP in POAG, PACG and normal groups

	POAG	PACG	Normal
Mean IOP $\pm$ SD (mmHg)	23.96 $\pm$ 4.48	28.87 $\pm$ 8.55	14.2 $\pm$ 3.85

The RNFL thickness of the POAG and the PACG groups were found to significantly decrease with increasing IOP [Multiple regression analysis, ( $r=-0.68$ ,  $p<0.001$  and  $-0.96$ ,  $p<0.001$ ) respectively]. Similarly, the endothelial cell count of the POAG and the PACG groups were found to significantly decrease with increasing IOP, [Multiple regression analysis, ( $r=-0.57$ ,  $p<0.001$  and  $-0.96$ ,  $p<0.0001$ ) respectively]. Also, there seems to be a greater decrease in the endothelial cell count in the PACG group in comparison to the POAG group (**Table 5, Figure 4, 5**).

**Table 5** Comparison of RNFL and endothelial cell count with IOP level in POAG and PACG patients

IOP (mmHg)	Mean RNFL( $\mu$ )				Mean endothelial cell density( $\mu$ )			
	POAG	r value	PACG	R value	POAG	r value	PACG	R value
15-20	86.6+ -18.9	r= -0.68p <0.001	79.8+- 17.4	r= -0.57p <0.001	2545+- 245	r= -0.85p <0.001	2399+- 218	r= -0.96p <0.001
20.1-25	81.2+ -15.4		80.1+- 18.53		2456+- 312		2231+- 256	
25.1-30	79.3+ -14.3		70.5+- 16.90		2331+- 256		1931+- 201	
>30	68.2+ -15.4		60.8+- 13.3		2102+- 245		1672+- 189	

## DISCUSSION

Glaucoma affects around 60.5 million people worldwide, with 8.4 million people with bilateral blindness and millions more suffering from visual disability.<sup>8</sup> Glaucoma has been declared to be the second most common cause of blindness in adult population in India.<sup>9</sup> Knowledge about the relationship of corneal endothelial cell density and RNFL thickness in primary glaucoma may herald new possibilities towards earlier diagnosis of this potentially blinding condition.

In a previous study by Gagnon et al, it was concluded that corneal endothelial cell counts were significantly lower in patients with glaucoma than in controls. In the glaucoma group, cell counts were inversely proportional to the means of IOPs.<sup>10</sup> Cho SW et al concluded that there was a significant decrease in corneal endothelial cell density in eyes with primary open-angle glaucoma, but not in normal eyes. Elevated intraocular pressure likely affected the decrease of corneal endothelial cell density in eyes with glaucoma.<sup>11</sup> In another study conducted by Kirsi Setälä, corneal endothelial cells of 25 patients with unilateral acute glaucoma were photographed with a clinical specular microscope. It was concluded that there was a clear correlation between the duration of elevated pressure and the number of central corneal endothelial cells lost.<sup>12</sup> In our study, there seems to be a greater decrease in the corneal endothelial cell count in the PACG group in comparison to the POAG group. However, we did not take into account the duration of the disease in the two groups, and that might affect the outcome of the study.

Christopher Bowd et al found in their study that quantitative differences in RNFL thickness exist between age-matched normal and glaucomatous eyes.<sup>13</sup> Li Guo et al demonstrated that RGC apoptosis in glaucoma

correlates strongly with elevated IOP and is significantly associated with IOP-induced changes in specific ECM components in the RGC layer.<sup>14</sup> In our study, the RNFL thickness and corneal endothelial cell density was seen to significantly decrease with increasing IOP, in both the POAG and the PACG groups. These findings may have significant implications in the early detection of the changes that occurs in glaucomatous eyes.

To our knowledge, ours is the first study, which correlates corneal endothelial cell density with RNFL thickness in primary glaucoma patients. In our study, it was found that in all the three groups (normal, POAG and PACG groups), the corneal endothelial cell density positively correlated with average RNFL thickness parameters (Pearson's correlation coefficient: r=0.55, 0.68, 0.58 respectively). However, further prospective studies are needed to substantiate the correlation between RNFL thickness and corneal endothelial cell density in primary glaucoma patients, while considering other factors which affect the RNFL thickness and corneal endothelial cell density.

## CONCLUSION

Lower corneal endothelial cell density correlates well with thinner RNFL in primary glaucomatous eyes. Also, the rate of damage to RNFL and the corneal endothelial cells in primary glaucoma patients is directly proportional to increasing IOP. Knowledge about the relationship of corneal endothelial cell density and RNFL thickness in primary glaucoma may herald new possibilities towards earlier diagnosis of this potentially blinding condition. However, further prospective, longitudinal studies are necessary to substantiate the relationship between RNFL thicknesses with corneal endothelial cell density in primary glaucoma, particularly taking into account the duration of the disease.



**Ethical clearance:** Taken.

**Conflict of interest:** No conflict of interest.

**Contribution of authors:** We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors

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## SUBMISSION OF MANUSCRIPT

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ORIGINAL PAPER

# Knowledge of Mother Regarding Oral Health of Preschool Children in the Kamrup District of Assam

**Dutta Arunjyoti\***

*Received on July 6, 2015; accepted (revised) on July 13, 2015*

## ABSTRACT

*Children under the age of 5, generally spend most of their time with their parents and guardians, especially mothers, even when they attend preschools or nurseries. It has been found that young children's oral health maintenance and outcomes are influenced by their parent's knowledge and awareness. The present study was undertaken to assess the knowledge of mothers regarding the oral health of their preschool children; residing under Hajo Block Primary Health Centre in the Kamrup (R) district of Assam. A cross sectional descriptive study was undertaken among 160 mothers of children aged between 36 months to 71 months chosen on simple random (lottery method) sampling technique for which the study period was from September to December, 2014. The data collection instrument was a structured interview schedule composed (in Assamese) and delivered directly through face to face interview. The findings of the study revealed that regarding knowledge on oral health, majority (67.5%) had moderately adequate knowledge, 22.5% had adequate knowledge and 10.0% had inadequate knowledge. In regards to knowledge on dietary practices, majority of the mothers (66.25 %) have moderately adequate knowledge followed by adequate (25%) and 8.75% have inadequate knowledge. Further, the study revealed a significant association between knowledge and age, educational qualification of fathers and mothers. The findings of the study demonstrated that there is lack of knowledge regarding oral health among the mothers of preschool children. Therefore, if oral health promotion efforts are to be effective in improving the oral health of young children, it is essential that there should be a good understanding*

*of parental and caregiver's knowledge and attitudes.*

**Keywords:** Oral health, preschool children, mother

## INTRODUCTION

Oral health is an integral component of preschool health and well-being. Unfortunately, many children are afflicted with dental caries at an early age, as young as 12 months.<sup>1</sup> The first sign of dental caries lesions in infants who develop Early Childhood Caries (ECC) is the appearance of white demineralization areas in the cervical regions of the maxillary anterior teeth. This serves to indicate high caries lesion activity in children.<sup>3, 4</sup> The appearance of a single caries lesion on any tooth surface in an infant or toddler must be considered a serious health problem. It has been stated that ECC can be defined as the occurrence of any sign of dental caries lesions on any tooth surface during the first 3 years of life.<sup>5, 6</sup>

The prevalence of caries lesions is a multi factorial disease. These factors include susceptible tooth and host, fermentable carbohydrates in the diet, cariogenic micro organisms, and time.<sup>5</sup> Children with caries lesions in the primary dentition have a greater chance of developing caries lesions in the permanent dentition than children who are caries lesion free in the primary dentition.<sup>7, 8</sup> Initial primary incisor caries lesions before 4 years of age

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is a risk factor for future dental caries lesions.<sup>9</sup> India, with a population that exceeded 1 billion in 2001, is the second most populous nation in the world where eighty percent of the population lives in rural areas.

Studies using phenotyping and/or genotyping methods strongly suggest that mother is the major primary source of infection for children.

Improper feeding practices by mothers/caregivers increase the risk for the development of early childhood caries in infants and toddlers, by promoting the early establishment of *S. mutans* in the oral cavity.<sup>10</sup>

Children under the age of 5 generally spend most of their time with parents and guardians, especially mothers, even when they attend pre-schools or nurseries. These early years involve “primary socialization” during which the earliest childhood routines and habits are acquired<sup>11</sup> These include dietary habits and healthy behaviors established as norms at home and are dependent on the knowledge and behavior of parents and elder siblings. Studies have reported that poor attitude of parents toward oral health of infants and young children are associated with increased caries prevalence.<sup>12</sup>

It has been found that a more positive parents’ knowledge and attitudes toward dentistry; the better will be the dental health of their children.<sup>13</sup> Young children’s oral health maintenance and outcomes are influenced by their parent’s knowledge and beliefs, which affect oral hygiene and healthy eating habits. Without basic knowledge of caries risk factors, importance of the deciduous teeth and oral maintenance, it is difficult to employ effective disease preventive strategies.<sup>14, 15</sup> Parent’s knowledge and positive attitude towards good dental care is very important in the preventive cycle. The aim of the present study was to assess the mother’s knowledge about the oral health of their pre-school children under Hajo Block Primary Health Centre in Kamrup (R) district of Assam.

## OBJECTIVES

The present study intended : (1) To assess the knowledge of mothers of preschool children on oral health and (2) To find out the association between knowledge on oral health among the mothers of preschool children and some selected variables.

## MATERIAL AND METHODS

A cross sectional descriptive study was undertaken among 160 mothers. The sampling frame for this study comprised

of mothers of the children aged between 36 months to 71 months and who are residing under Hajo Block Primary Health Centre in Kamrup(R) district of Assam. Mothers were selected by simple random (lottery method) sampling technique. The tool used for data collection consists of the following:

**Part 1. Demographic characteristics:** It consists of ten items which includes age, gender, religion, type of family, history of oral-dental problems, father’s and mother’s educational qualification. There was no scoring for these items.

**Part 2. Knowledge questionnaire:** This part of the questionnaire contains items related to knowledge on pre-school child’s oral health. It consists of 20 items. The areas selected were:

- (a) Diet and dietary practices
- (b) Oral hygiene practices

The subjects were requested to choose and mark (“”) in the most appropriate option (answer). Four options were provided for each item. Each correct answer carried a score of one and each wrong answer carried a zero. The maximum score was 20. Based on the scores the knowledge levels were ranged in **Table 1**.

**Table 1** Knowledge level of Participants

Grade knowledge	Score range
Adequate (Mean +SD)	Above 12
Moderate (Mean – SD to Mean + SD)	6-12
Inadequate (Mean – SD)	Below 6

## DATA ANALYSIS AND INTERPRETATION

All the items in the tools were coded and transferred to a master sheet for computer programming. Statistical analysis has been performed by using SPSS software version 18.0 to analyze the data. Frequency and percentage distribution was used to describe the demographic variables. The Chi square ( $X^2$ ) test was applied to determine the association between the knowledge of the mother and selected socio demographic variables. Significance levels was fixed at 95% confidence intervals (p value <0.05).

### Section I: Demographic Characteristics

The study showed that most of the children (38%) were between the age group of 48 to 59 months, 34% were

between 60 to 71 months and 28% were between 36 to 47 months of age. Sex wise distribution shows that majority of the school children (65%) were male and 35% were female. Findings on religion showed that majority of the children (89%) were Hindu. In relation to type of family, 80% belonged to nuclear family and 20% belonged to joint family. Father's educational level of majority of the children was higher secondary (47%), followed by graduate and above (37%). Mother's educational level was as follows; secondary 30%; upto higher secondary 33%; graduate and above 23%, upto primary education 8% and illiterate 6%. Forty eight percent of preschool children had no history of oral/dental problems whereas 52% had a history of oral/dental problems.

## Section II: Knowledge on oral health among mothers

**Table 2** Distribution of mother according to their level of knowledge (n=160)

Level of knowledge	Score range	Percentage (%)
Adequate	Above 12	22.5
Moderate	6-12	67.5
Inadequate	Below 6	10.0

Data presented in **Table 2** shows overall knowledge on oral health. Majority (67.5%) had moderately adequate knowledge followed by 22.5% adequate knowledge and only 10% had inadequate knowledge. Thus, the findings indicate that there is lack of knowledge on oral health among the mothers. The above data is presented diagrammatically below:

**Table 3** Range, mean, median, standard deviation of knowledge of subjects on oral health (n=160)

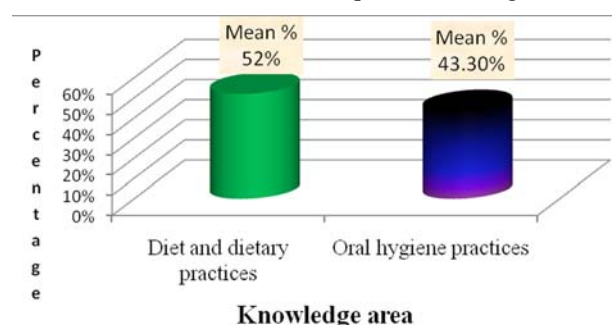
Statistics	Value
Range	13
Mean	8.90
Median	9.00
Standard deviation	±2.932

The data presented in the above table shows that the range of knowledge scores i.e.13, mean (8.90), median (9.00) and standard deviation (±2.932)

**Table 4** Distribution of mother according to knowledge on diet and oral hygiene

Knowledge	Diet	Oral hygiene
Inadequate knowledge	14(8.75%)	18(11.25%)
Moderately adequate	106(66.25%)	110(68.75%)
Adequate	40(25%)	32(20%)

From table 4 it is observed that majority of the mothers (66.25 %) had moderately adequate knowledge on dietary practices for their child followed by adequate (25%) and inadequate knowledge (8.75%). Regarding knowledge on oral hygiene it was observed that 68.75% have moderately adequate knowledge, 20% of them have adequate and 11.25% of mothers have inadequate knowledge.



**Figure 1** Bar diagram shows distribution of knowledge scores by mean percentage according to knowledge areas.

**Table 5** Association between knowledge on oral health and selected socio-demographic variables

Variables	Category	Chi square value	Df	p-value	Significance
Child age (in months)	36-47	17.02	2	0.000	S
	48-59				
	60-71				
Gender	Male	0.52	1	0.453	NS
	Female				
Religion	Hindu	0.658	1	0.455	NS
	Muslim				
	Others				
Type of family	Nuclear family	0.261	1	0.577	NS
	Joint family				
Father's education	Illiterate	15.51	3	0.000	S
	Primary				
	Secondary				
	Higher secondary				
	Graduate and above				
Mother's education	Illiterate	31.60	4	0.000	S
	Primary				
	Secondary				
	Higher secondary				
	Graduate and above				
History of oral or dental problems	Yes	1.056	1	0.304	NS
	No				



The findings showed that the relationship of knowledge on oral health with the demographic variables included in the study. Chi-square values for gender, religion, type of family, history of oral and dental problems are 0.473, 0.455, 0.687 and 0.304 respectively which are not significant at 0.05 levels. Therefore, it indicates that knowledge on oral health among the mothers of preschool children is independent of the above selected demographic variables.

However, Chi-square ( $\chi^2$ ) values for age, father's and mothers' educational qualification are 0.000, 0.000 and 0.000 respectively which are significant at p value 0.05 level. Therefore, it can be concluded that there exists a relationship between these factors with the knowledge on oral health.

## DISCUSSION

The present study found that regarding overall knowledge on oral health, only 22.5% of mothers had adequate knowledge, majority (67.5%) had moderately adequate knowledge and 10% had inadequate knowledge. The finding of the present study is consistent with the study conducted by B Kanmani on effect of oral care on oral hygiene among children in Kancheepuram District, Tamil Nadu. The results show that 86% of children had inadequate knowledge and 14% had moderately adequate knowledge on oral care.<sup>17</sup>

In the present study it was revealed that majority of the mothers (66.25 %) were having moderately adequate knowledge on dietary practices for their child followed by adequate (25%) and inadequate knowledge (8.75%). The mothers were having moderately adequate knowledge, i.e. 68.75%, 20% of adequate and 11.25% of inadequate knowledge regarding oral hygiene. Similar results were reported by Lin *et al*,<sup>16</sup> and Pradeep Kumar *et al*.<sup>17</sup> Majority of the mothers had good knowledge regarding the role of diet in oral health; they believed that sweet snacks and sweet drinks contribute to caries.

Oliveira ER, Narendran S, Williamson D conducted a study among the third grade school children in Harris County, USA which revealed that most children reported "fairly adequate" oral hygiene habits (58%) and oral health knowledge (48%), and "adequate" dietary patterns (59%) which indicates that there is a need to improve oral health knowledge and preventive practices. These studies support the findings of the present study in terms of lack of knowledge among the school children regarding oral

health and hygiene.<sup>18</sup> Some other study found that the mean literacy score was 15.8 (SD = 5.3; range = 1-30). Adjusted for age, education, and number of children, low literacy scores (< 13 REALD-30) were associated with decreased knowledge (OR = 1.86; 95% CI = 1.41, 2.45) and poorer reported oral health status (OR = 1.44; 95% CI = 1.02, 2.05). Lower caregiver literacy was associated with deleterious oral health behaviors, including nighttime bottle use and no daily brushing/cleaning.<sup>19</sup>

The present study revealed that Chi-square ( $\chi^2$ ) values for age, father's and mothers' educational qualification are 0.000, 0.000 and 0.000 respectively which are significant at p value 0.05 level. A similar study conducted by Chun-Hung Chu, Ping-Lit Ho, and Edward CM Lo and found that statistically significant at 0.005 level ( $F=19.300$ ) for mother's educational level.<sup>20</sup> The result indicates that better knowledge is observed in school children whose mothers are more educated.

## CONCLUSION

Nurses have a very important role to play in the early detection, treatment and prevention of diseases and also to enable individual and families to attain and maintain the highest possible level of health. The ultimate goal of nursing intervention is to help people to help themselves.

Administrators in nursing service both in the hospital and community should initiate and organize in-service education programs so that practicing nurses are kept up-to-date with advances in the field of nursing. The need for research among nurses has been recognized. Research will provide nurses the credibility to influence the health policy.

The study was conducted to find out the existing knowledge of mothers regarding oral health of their children which was found to be lacking. If oral health promotion efforts are to be effective in improving the oral health of young children, it is essential that there should be a good understanding of parental and caregiver's knowledge and attitudes. Such findings may help to guide and modify current and future oral health prevention activities. Therefore, regular school health programme and also regular dental health check up needs to be organized in the community.

**Ethical Clearance:** Taken.

**Conflict of Interest:** None declared.

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ORIGINAL PAPER

# A Retrospective Study of Intra-uterine Fetal Deaths at a Tertiary Care Centre

**Goswami Bivarani<sup>1</sup>**

*Received on 1<sup>st</sup> September, 2015; accepted on 8<sup>th</sup> September, 2015*

## ABSTRACT

**Objective:** To identify the risk factors and to streamline preventive and management protocols for intra uterine fetal death (IUD).

**Methods:** This was a retrospective study from Jan'11 to Feb'14 which was conducted at FAA Medical College, Barpeta, Assam. IUD was defined as fetal death beyond 28 weeks of gestation and / or birth weight >500gm. Maternal and fetal records were analyzed. Mode of delivery and associated complications were studied.

**Results:** Total number of deliveries were 1776 with total no of IUD being 57. Incidence of IUD at our institute was 32 per 1000. Of these 51% (29) were ante-partum and 49% (28) were intra-partum. In 7% of cases, no causes were indentified. Among the identifiable causes, very severe anemia (37 %) and hypertensive disorders (17%) were most common followed by placental causes (16%). Induction was done in 10 patients, 47 patients had spontaneous onset of labour and caesarean section was done in 7 patients. **Conclusions:** The present study is an effort to compile a profile of maternal, fetal and placental causes culminating to IUD at our institute. This emphasizes the importance of proper antenatal care and identification of risk factors and its treatment. Institutional deliveries should be promoted to prevent intra-partum fetal deaths. A substantial number of IUD are still labeled as unexplained, hence cannot be prevented. Decrease in the incidence of IUD would significantly reduce the perinatal mortality.

**Keywords:** Intra uterine fetal death, unexplained fetal death, tertiary care centre

## INTRODUCTION

Intrauterine fetal death (IUD) is an unfortunate and tragic situation for the obstetrician and a traumatic event for the family. WHO defines IUFD as death prior to the complete expulsion or extraction from its mother of a product of conception after the age of viability (according to American College of Obstetricians and Gynecologists, ACOG-22 weeks.<sup>1</sup> The Perinatal Mortality Surveillance Report [CEMACE, 2011] defines stillbirth as a baby delivered without signs of life after 24 completed weeks of pregnancy and was accepted by the Royal College of Obstetricians and Gynecologists in their 2010 Green-top Guideline.<sup>2</sup> Only cases with > 28 weeks of gestations are included in this study.

More than 3.2 million stillbirths occur globally each year. Still birth rate in India is 9 per 1000 total births. Perinatal mortality includes number of stillbirths in the first week of life per 1000 live births. It is a major marker to assess the quality of health care delivery. Intrauterine fetal death (IUFD) remains one of the areas of obstetrics in which improvements could be made.

The major problem facing the obstetrician is the identification of those truly at risk remains problematic as many cases seem to occur in the absence of recognized risk factors. Intrauterine fetal death is a significant

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contributor to perinatal mortality in developing countries although improved antenatal care, advanced techniques of perinatal diagnosis and better intrapartum monitoring has reduced the incidence. Intrauterine fetal death may be antepartum or intrapartum. Antepartum fetal deaths are associated with several maternal, placental or fetal factors. Hypertensive disorders of pregnancy, anaemia, obesity, diabetes, high parity, advanced maternal age are well recognized maternal factors whereas congenital anomalies and intrauterine growth retardation are important fetal factors. Placental causes include abruption and antepartum hemorrhage. Intrapartum fetal death is usually the result of fetal distress and / or obstructed labour and reflects poor quality of clinical care. Cord complications include cord prolapse, tight cord around neck and true knot.

Our study was carried out with the aim of identifying epidemiology of intrauterine deaths and its risk factors, to find the incidence and to streamline the preventive and management protocols in our rural population at Barpeta and nearby areas.

## MATERIALS AND METHODS

This was a retrospective study from Jan 2011 to Feb 2014 which was conducted at FAA Medical College, Barpeta, Assam. Total number of deliveries during this period was 1776. Among this, total number of IUD including both ante and intra partum deaths were 57. Pregnancy and maternal characteristics related data were collected from tickets and labour room register books of the hospital. Fetal death diagnosed by ultrasound before the 28th week of gestation was excluded. Records of mother were thoroughly analyzed taking into account the age, parity, gestational age, associated complicating factors like hypertensive disorders of pregnancy, diabetes, Rh isoimmunization, severe anaemia, history of IUD in previous pregnancy. Fetal characteristics were studied with respect to sex, birth weight and gross congenital anomalies. Risk factors related to placenta and cord i.e. true knot, cord prolapse and tight cord around neck were also analyzed along with mode of delivery associated complications and co-morbidities were also studied. Transabdominal USG was done to confirm IUD. Laboratory investigations were studied. Postmortem examination of dead foetus after delivery was not performed.

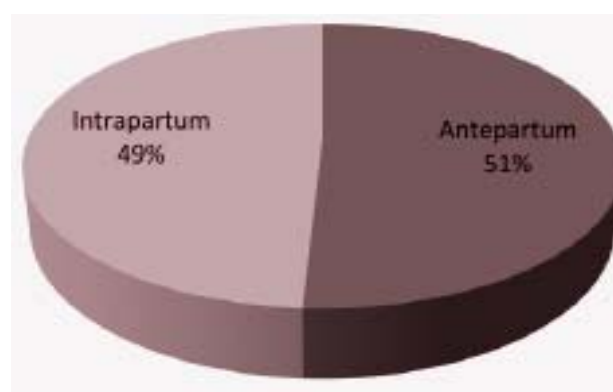
## RESULTS

Total number of deliveries in our study was 1776 and total no of IUD was 57. Incidence of IUD at our centre was 32 per 1000.

### Age wise distribution of cases:

An initial univariate analysis was performed to identify those factors that seemed to be associated with stillbirth. Majority of the patients were belonged to age groups 21–30 years, i.e., the period of maximum reproducibility. 51% (29) were ante-partum and 49% (28) were intra-partum death (**Figure 1**).

## Timing of Diagnosis



**Figure 1** Age wise distribution of cases

### Causes of Intrauterine Fetal Death (IUD):

In 7% cases, no causes were identified. Among the identifiable causes, 37% was very severe anemia (21) and it was the most common cause. Hypertensive disorders was in 17% (10) followed by placental causes (16%). Among the placental factors, 16% were due to ante partum haemorrhage. Among the APH, 11% were due to abruption and 5% IUDs were due to placenta previa. Malpresentation was in 12% IUDs. Obstructed labour (3%) was the major intrapartum factor. Ruptured uterus was in 2% cases, multiple pregnancies in 2% cases and in 2% cases cause was fetal malformation. In 7% cases of IUD no cause was identified. The different causes of IUDs are shown in **Table 1**.



**Table 1** Different causes of Intrauterine Fetal Death (IUD) cases

Sl. No	Causes	Frequency	Percentage(%)
1	Severe anaemia	21	37
2	Antepartum Haemorrhage	09	16
3	Malpresentation	07	12
4	Pregnancy Induced Hypertension	06	10
5	Eclampsia	05	7
6	Obstructed Labour	02	3
7	Ruptured Uterus	01	2
8	Fetal malformation	01	2
9	Twin Pregnancy	01	2
10	Prolonged Labour	01	2
11	Unidentified	04	7
<b>Total number of IUD cases</b>		<b>57</b>	<b>100</b>

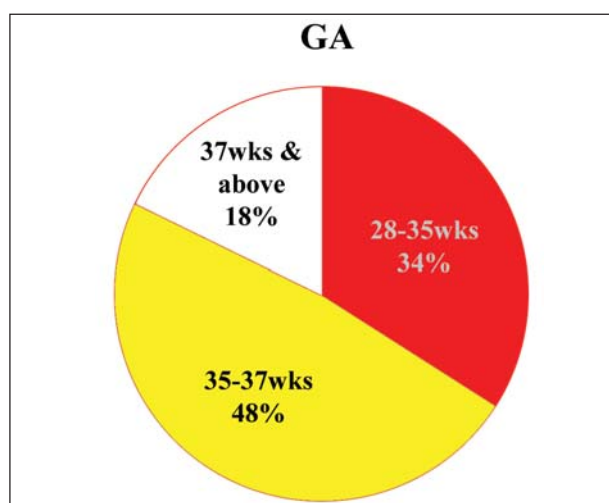
We observed that 39% of IUDs were primipara and 61% were multipara. Out of 61% multipara, 21% patients were grand multipara. Women who are older have a greater risk of stillbirth. Parity, although not significant on univariate analysis, showed in the multivariate analysis that being para 2 was slightly protective against stillbirth. When the causes among primipara and grand multipara were analyzed, placenta previa was found to be common in grandmultipara, but in primipara, causes were mainly unexplained.

**Modes of delivery:** Out of 57 IUDs, induction was done in 10 patients, 47 patients had spontaneous onset of labour (**Table 2**).

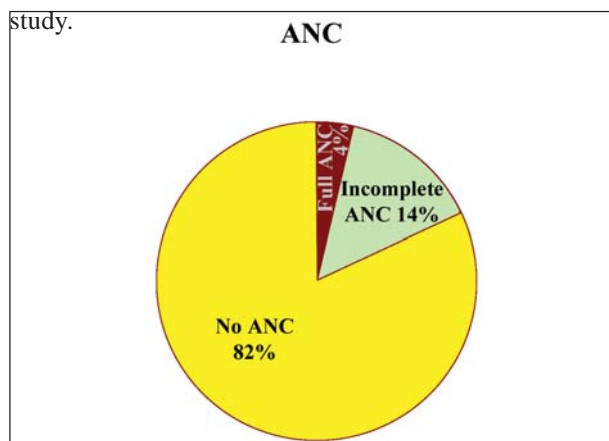
**Table 2** Modes of delivery of intrauterine fetal death (IUD) cases

Sl. No	Modes of delivery	Number of cases	Percentage (%) of cases
1	LSCS	07	12.2
2	LSCS	01	1.7
3	Breech extraction	06	10.5
4	SVD	43	75.4
<b>Total number of cases:</b>		<b>57</b>	<b>100</b>

**Gestational Age (Figure 2):** Majority (48%) of IUD occurred between 35-37 wks of pregnancy. 34% occurred between 28-35 wks of pregnancy. At term or post mature pregnancy IUD occurred only in 18%. Two fetal deaths were diagnosed after the 41st week of gestation.

**Figure 2** Diagnosis of IUD at different gestational age

**Frequency of antenatal check-up:** In our study we observed that full antenatal check-up was done only in 4% of cases. In 14% cases patients visited antenatal OPD only 2-3 times. ANC was not carried out in 82% cases in our study.

**Figure 3** Frequency of antenatal check-up of the cases

**Investigations (Figure 3):** In our study investigations was done only in 14% cases. Other 86% cases did not do any investigation and did not attend ANC clinic or were irregular in ANC.

It was observed that 58% of dead fetus weighed from 1.5 to 2.5 kg. Among the IUD fetuses, male sex was found to be significantly higher (64%) as compared to female sex (36%). In our study 66% fetuses were non-macerated as compared to 34% macerated fetuses. Most common morbidity encountered in patients with IUD was psychological upset (30 % patients).

## DISCUSSION

In our study, we tried to identify pregnancy features associated with IUD. Incidence of IUD at our institute were found to be 32 per 1000 which is in accordance to the study conducted by Maleckiene L et al in Lithuania<sup>3</sup> and was comparable to other studies also.<sup>4, 5, 6</sup> Out of 57 cases, only 9 (15.7%) cases were booked and 48 (84.3%) cases were unbooked. Patients were admitted with chief complaints of loss of fetal movements or less fetal movements (78.3%), pain abdomen (6%) and bleeding per vaginum (15.7%).

It is interesting that in more than half of the recorded cases (54.7%) the complaint was of reduced or absent fetal movements. Reduced fetal movements can be associated with adverse fetal outcome, and women who report reduced fetal movements should be investigated thoroughly. In our study majority of women were in the age group 20-30 years. This is in contrast to other studies<sup>7, 8</sup> where advanced maternal age was associated with higher risk of IUD. This is because more pregnancy occurs in early age as in our locality as early marriage is prevalent.

Intrapartum fetal death accounted for 49 % of fetal deaths. Among intrapartum complications, Malpresentation (12%) leading to IUD was common (6.08%). Next case was obstructed labour (3%). These are rarely seen in developed countries. In our locality, this is due to patient's ignorance, late diagnosis of malpresentation and lacks of well equipped health care delivery system at grass root level. In our study; cause of intrauterine fetal death was identifiable in 93% fetuses which included both .....

Cause of antepartum IUD was maternal, fetal and placental factors. Among the maternal factors very severe anemia (37%), i.e. Hb- 4-5gm/dl and hypertensive disorders of pregnancy (17%) were associated with significant number of fetal deaths. This was observed because our institute being tertiary care centre where patients were referred from elsewhere. Majority of patients were unbooked and did not receive any antenatal care. Hypertension as a leading cause of IUD was also seen in several other studies.<sup>11, 12</sup>

In our study 39% patients were primipara, 21% were grand multipara<sup>13</sup> and parity of 2 to 4 were 40% which was in accordance with study conducted by Tariq et al who also found that parity has no relation with IUD.<sup>14</sup>

A past history of intrauterine fetal death indicates some

subclinical genetic or chromosomal problem, which can recur in future pregnancies. Our study showed a solitary case with congenital Neural tube defect, which also had a history of previous IUD due to anomaly. This was in contrast to the study conducted by Tariq et al where congenital malformations accounted for 25.2% cases of IUD. This may be due to the lack of folic acid supplementation in periconceptional period.<sup>15</sup>

Two of the cases had Rh-ve blood group, but there was no Rh isoimmunization in our study. Cause of IUD was different in those two cases. One was due to obstructed labour and the other was due to severe anemia. This was supported by a study conducted by Choudhury Anjali and Gupta Vineeta.<sup>16</sup>

Among the placental causes, 11% was due to abruption and 5% was due to placenta previa. This is in accordance to study conducted by Jahanfar et al.<sup>17, 18</sup>

It was noticed that most of our fetuses were lost between 35- 37 weeks (48%). 18% IUD occurred at 37 weeks and beyond. The critical peak at which fetuses were lost is variable in various literatures suggesting different predisposing pathology for IUD in different communities.

It is evident that poor growth was a factor in many of these cases. The vast majority of IUGR fetuses were not diagnosed during the antenatal period. A previous study performed in Kathmandu<sup>19</sup> during a similar time frame confirmed that only 17% of fetuses in < 10th percentile group were identified antenatal in a population of women identified as being low-risk at booking. In our study, there was no antenatal checkup in 82% cases and no investigations were done in 86% cases primarily because of ignorance and poor socioeconomic condition. This is also in accordance to other studies<sup>20</sup>. Post mortem was not done in our study. Hence, in 7% cases, causes were obscure.

## CONCLUSION

The purpose of counting IUD is to understand the contributory factors and to seek ways of avoiding recurrence by proper antenatal care and early diagnosis of complications and its adequate management. Clinical assessment and evaluation is recommended to assess maternal wellbeing and to determine the cause of death, the chance of recurrence and of avoiding further pregnancy complications (RCOG, 2010 guidelines). The maternal risk factors such as hypertension, severe anaemia

and diabetes control can prevent intrauterine fetal death. First and second trimester ultrasound evaluation may be helpful to rule out congenital malformations and placental disorders which are also implicated in intrauterine fetal death. Better intrapartum fetal monitoring for high risk cases can lead to prevention of IUFD. In conclusion, the associated risk factors in our community seem to be preventable. Attention should be paid to health education with emphasis on antenatal care, the benefit of regular attendance, improved periconceptional environment, nutrition and micronutrient status especially iron and folic acid intake. Identification of high risk cases and timely referral to higher centres may save the baby. Patient compliance is important in reducing most of these preventable fetal losses.

Women with a history of IUFD should attend antenatal clinic in their next pregnancy and undergo increased antenatal surveillance. Future research should focus on improved means of clinical assessment of fetal well being and defining pathophysiological pathways leading to still birth associated with maternal disease. Parents have the greatest stake of all in the wellbeing of their baby, and must be part of the drive to reduce stillbirth. We must let the life of every mother and baby count.

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**Ethical clearance:** Taken.

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ORIGINAL PAPER

# Histopathological Spectrum of Breast Lesions - A Hospital Based Study

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## ABSTRACT

**Objective:** A retrospective study of four years duration was undertaken to determine the histopathological spectrum of breast lesions including both the benign and malignant lesions.

**Methods:** The histopathological findings of the biopsied specimens were studied in 99 cases of all age groups and both sexes.

**Results:** Out of the 99 cases, benign lesions constituted 74.75% and malignant 25.25%. The commonest benign lesion was fibroadenoma and commonest malignant lesion was infiltrating duct carcinoma. Few uncommon lesions like inflammatory pseudotumour, atypical ductal hyperplasia, complex fibroadenoma, and myofibroblastoma were detected.

**Conclusion:** Breast lesions are a cause of concern not only for the patients but also for the pathologists and the surgeon. No data regarding benign breast diseases in this region is available as yet. Identification of benign lesions simulating malignancy and premalignant lesions is important for follow up of cases. It is important to distinguish between benign and malignant lesions like phyllodes tumour as approach to diagnosis and management differs.

**Keywords:** Atypical ductal hyperplasia, inflammatory pseudotumour, phyllodes tumour, fibroadenoma, infiltrating duct carcinoma

## INTRODUCTION

Histopathology plays an important role in management of breast diseases. It is a necessary component of diagnosis, treatment and prognosis in most breast disorders. Also, when assessing the adequacy of treatment in breast cancer, pathologic assessment is the main criterion.<sup>1</sup>

The main purpose of this study is to analyze the spectrum of breast lesions in patients attending a newly set up Medical college and Hospital at Jorhat, Assam. This new Medical College and Hospital caters to the people belonging to Jorhat, Majuli and the adjoining districts of Golaghat, Sibsagar and Karbi-Anglong. No data regarding breast diseases in this region is available as yet. Clinico-pathological features of both the benign and malignant breast lesions of all ages and both sexes were studied.

In India, carcinoma breast is the second most common malignancy in woman after cervical cancer and is detected in 20 per 1,00,000 women.<sup>2,3</sup> But it is fortunate that the majority of the breast lesions in outpatient visits prove to have a benign pathology.<sup>4</sup>

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The term “benign breast diseases” encompasses a heterogeneous group of lesions including developmental abnormalities, inflammatory lesions, epithelial & stromal proliferations and neoplasms that may present a wide range of symptoms or may be detected as incidental microscopic findings. The incidence of benign breast lesions begins to rise during the second decade of life and peaks in the fourth and fifth decades, as opposed to malignant diseases, for which the incidence continues to increase after menopause, although at a less rapid pace.<sup>5</sup> Breast cancer comprises 1.38 million cases (10.9% of total cancer cases) worldwide according to the global statistics 2008.<sup>6</sup>

## MATERIALS AND METHODS

The study was conducted in the department of Pathology, Jorhat Medical College & Hospital from January 2011-December 2014. Clinical features and details were noted from the histopathology requisition forms. Histopathological examination was done on formalin fixed and paraffin processed tissues from surgically resected specimens and stained by haematoxylin and eosin.

## OBSERVATIONS

Ninety-nine cases having breast lesions were studied over a period of four years (Jan 2011 to Dec 2014). In all the breast lesions the commonest presenting symptom was lump in the breast.

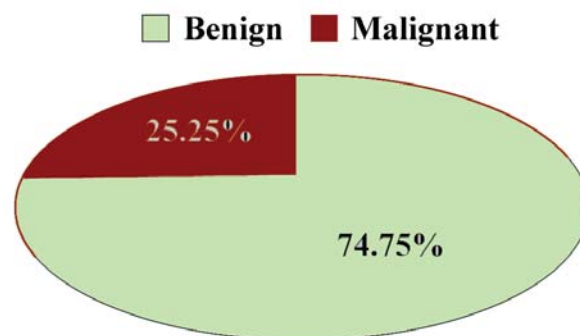
Out of the 99 cases, benign lesions constituted 74.75% and malignant 25.25% (**Figure 1**). The commonest benign lesion was fibroadenoma followed by fibrocystic disease and commonest malignant tumour was infiltrating duct carcinoma as shown in **Table 1**.

Of all the cases, four were males and ninety-five were females. Gynaecomastia formed the majority of the cases in the male (4.05%), which is higher than other Indian studies as shown in **Table 2**. The youngest male (12 years) was diagnosed with gynaecomastia and the youngest female (10 years) was diagnosed with fibroadenoma breast.

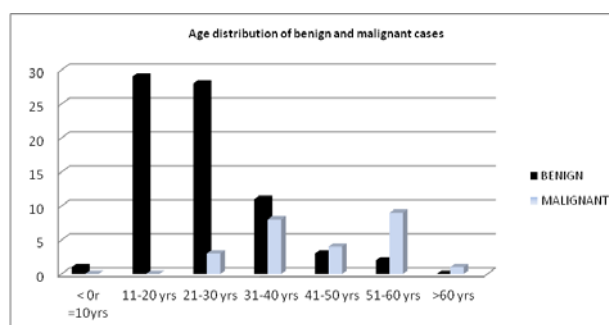
The ages of the cases ranged between 10 years to 60 years. The peak age of occurrence of the benign lesions was found to be in the 2<sup>nd</sup> and 3<sup>rd</sup> decades, youngest case detected as fibroadenoma at 10 yrs of age. The peak age of occurrence of the malignant lesions was found to be in the 4<sup>th</sup> and 6<sup>th</sup> decades, youngest case diagnosed as

infiltrating duct carcinoma at 30 yrs of age (**Figure 2**). Two peaks of occurrence of malignant cases one in premenopausal and the other in postmenopausal period were observed and this needs further evaluation.

### Benign versus malignant cases



**Figure 1** Pie chart showing % of benign & malignant cases



**Figure 2** Bar diagram showing age distribution of both the benign and malignant cases

**Table 1** Different histopathological lesion in benign and malignant groups

Histopathological diagnosis	Number of cases (%)	Overall Percentage	% of the group
<b>Benign group ( n-74)</b>		(Total %)	(Benign%)
1. Fibroadenoma	48	48.48	64.87
2. Atypical ductal hyperplasia	03	3.03	4.05
3. Benign Phyllodes	03	3.03	4.05
4. Fibroadenosis	03	3.03	4.05
5. Sclerosingadenosis	01	1.01	1.35
6. Fibrocystic disease	06	6.06	8.11
7. Gynaecomastia	03	3.03	4.05
8. Myofibroblastoma	01	1.01	1.35
9. Inflammatory pseudotumour	01	1.01	1.35

Histopathological diagnosis	Number of cases (%)	Overall Percentage	% of the group
10. Fibrolipoma	01	1.01	1.35
11. Inflammatory lesion	02	2.02	2.70
12. Abscess	01	1.01	1.35
13. Galactocele	01	1.01	1.35
<b>Malignant group (n-25)</b>			<b>(Malignant%)</b>
1. Infiltrating duct carcinoma	21	21.4	84
2. Infiltrating lobular carcinoma	02	2.0	8
3. Malignant Phyllodes tumour	01	1.0	4
4. Mucinous carcinoma.	01	1.0	4

Figure 3 to 8 shows the photomicrographs of few cases of breast lesions with different histopathological spectrum.

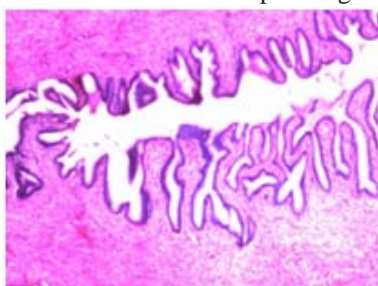


Figure 3 Photomicrograph showing malignant phyllodes

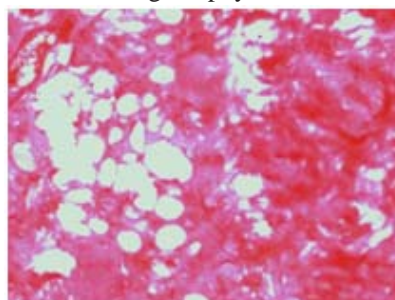


Figure 4 Photomicrograph showing Myofibroblastoma

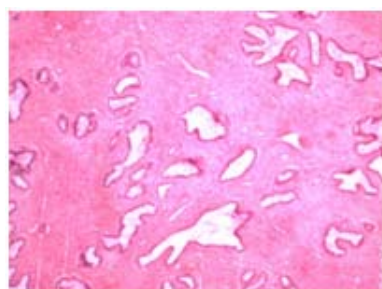


Figure 5 Photomicrograph showing Fibroadenoma

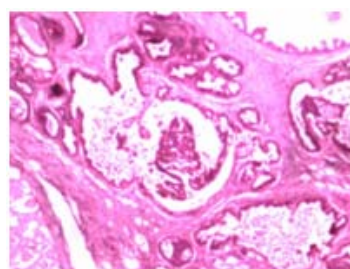


Figure 6 Photomicrograph showing Fibrocystic disease

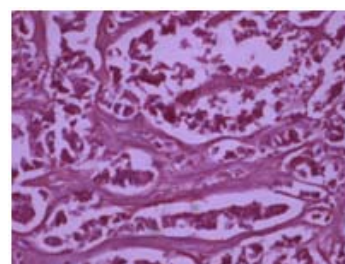


Figure 7 Photomicrograph showing Infiltrating Duct Carcinoma

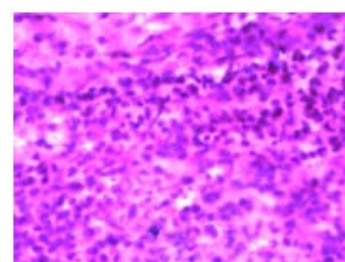


Figure 8 Photomicrograph showing Inflammatory Pseudotumours

## DISCUSSION

Breast problems for which patients consult doctors are breast pain, nipple discharge and palpable masses. Pathological or physiological nipple discharge is worrisome. 10 to 15% of women with benign breast diseases will complain of pathological nipple discharge. A breast mass and a cyst need histological diagnosis whereas the breast pain (mastalgia) remains the most common symptom in women.<sup>7</sup> In our study, majority of the patients presented with breast lump.

Breast diseases are more prevalent among females as compared to males and the pattern of breast diseases and their etiology varies among different countries and ethnic groups.<sup>8</sup> Benign breast diseases are more prevalent as compared to malignant and inflammatory, as seen throughout the world.<sup>9</sup> Risk factors for benign and

malignant breast diseases include low parity, nulliparity, low age at first birth and late menopause, highlighting the fact towards excessive circulating oestrogens.<sup>10, 11</sup>

Benign conditions of breast are significantly more common than the malignant conditions worldwide.<sup>9</sup> In our study too, benign lesions comprised 74.75% of the total lesions and malignant lesions 25.25%. The percentage of carcinoma appears to be slightly higher than that in the west (10%)<sup>12</sup> and closer to Africa (21%).<sup>13</sup> The benign to malignant ratio was 3:1 in the Calcutta study and exactly similar i.e. 3:1 in our study. At Calcutta the % of malignancy was 24.44% as compared to our study (25.25%).<sup>14, 15</sup>

**Table 2** Comparative study of spectrum of benign breast lesions.

Benign group	Malik R (% of benign)	Kulkarni S (% of benign)	Our study (% of benign)
1. Fibroadenoma	55.0	62.32	64.87
2. Atypical ductal hyperplasia	--	--	4.05
3. Benign Phyllodes	1.27	1.45	4.05
4. Fibroadenosis	0.32	4.35	4.05
5. Fibrocystic disease	28.38	11.5	8.11
6. Gynaecomastia	--	--	4.05
7. Myofibroblastoma	--	--	1.35
8. Inflammatory pseudotumour	--	--	1.35
9. Fibrolipoma	--	--	1.35
10. Inflammatory lesion	--	--	2.70
11. Abscess	--	1.45	1.35
12. Lactating adenoma	0.87	4.35	--
13. Chronic mastitis	6.84	2.90	--
14. Plasma cell mastitis	1.83	--	--
15. T.B. mastitis	2.46	1.45	--
16. Intraduct papilloma	0.48	1.45	--
17. Duct ectasia	0.56	2.90	--
18. Galactocele	--	0.72	1.35
19. Sclerosing adenosis	--	--	1.35
20. Misc	1.99	5.07	--

**Table 3** Comparative study of spectrum of malignant breast lesions

Malignant group	Malik R (% of malignant)	Kulkarni S (% of malignant)	Our study (% of malignant)
1. Infiltrating duct carcinoma	88.20	84.85	84
2. Infiltrating lobular carcinoma	3.21	3.03	08
3. Malignant Phyllodes tumour	--	--	04
4. Mucinous carcinoma.	0.64	3.03	04
5. Medullary carcinoma	2.57	--	--
6. Papillary carcinoma	0.86	3.03	--
7. Squamous cell carcinoma	0.64	--	--
8. Undifferentiated carcinoma	0.64	--	--
9. Non hodgkin's lymphoma	0.42	3.03	--
10. Intraduct carcinoma	1.50	3.03	--
11. Miscellaneous	1.29	--	--

**Table 4** Comparison with similar studies

Study group	Benign %	Malignant %
Our study	74.75	25.25
UR Singh et al 2009	80.7	19.3
Rasheed A. et al (2009-201) <sup>16</sup>	72.97	27.3
Malik et al (2003) <sup>17</sup>	80.7	19.30
Kulkarni S. et al (2009) <sup>18</sup>		

Out of the four male cases, three were of gynaecomastia and one was of fibroadenoma. In our study, commonest benign tumour was found to be fibroadenoma and commonest malignant tumour was infiltrating duct carcinoma. Similar results were noted in the other studies as mentioned in **Table 3** and **Table 4**. In a similar study in Nepal by UR Singh et al in 2000, it was found that Fibroadenoma (28.28%) followed by fibrocystic disease (21.71%) formed the majority of breast lesions sent for histopathology, which is similar to that seen by Khanna et al<sup>19</sup> from Banaras-India. It has been seen that in women between adolescence and the mid 20's, the lobules and the stroma may respond to hormonal stimuli in an exaggerated fashion with the development of single and multiple fibroadenomas. Fibrocystic change is one of the breast lesions with peak range of incidence at 31–35 years. Our findings were slightly lower than past studies as shown in **Table 2**. It occurs during ovulation and just before menstruation. During these times, hormone level changes, which often causes the breast cells to retain fluid and develop into nodule or cyst which feels like a lump when touched. These nodules and cysts spread throughout the breast. As hormone level rises just before and during menstruation, mammary blood vessels swell. The real incidence of fibrocystic disease is difficult to estimate and diagnosis depends a great deal on individual clinician or pathologist acumen.<sup>20</sup>

However there is a slight rising trend of phyllodes tumour showed in our study compared to the other study groups. Phyllodes tumor present histologically as intraductal growth of intralobularstroma with leaf like projections. In our study Phyllodes tumor accounts for 4.05% of all the breast lesions and have a peak incidence in premenopausal age. These findings were comparable with other published studies.<sup>7, 21</sup>

The importance of many benign lesions lies in their ability to mimic cancers and not all benign lesions are completely free of risks. The clinical significance of sclerosing adenosis lies in its mimicry of cancer. It may be confused with cancer on physical examination, by mammography, and at gross pathologic examination.<sup>21,22</sup> Inflammatory lesions of the breast are of clinical significance because of their potential for confusing them with cancer.<sup>17</sup>

In our study, the peak age of occurrence of the benign lesions was found to be in the 2<sup>nd</sup> and 3<sup>rd</sup> decades, youngest case detected as fibroadenoma at 10 yrs of age. The peak age of occurrence of the malignant lesions was

found to be in the 4<sup>th</sup> and 6<sup>th</sup> decades, youngest case diagnosed as infiltrating duct carcinoma at 30 yrs of age. Similar results were noted by other authors.<sup>16, 23, 24</sup> Our study showed 2 peaks of occurrence of malignant lesions i.e. 4<sup>th</sup> and 6<sup>th</sup> decades with slight decline in the 5<sup>th</sup> decade. Maximum numbers of malignant cases were found in the postmenopausal group. This needs further evaluation.

During this study, few uncommon breast lesions like atypical ductal hyperplasia, myofibroblastoma, inflammatory pseudotumour, complex fibroadenoma and malignant phyllodes tumour were encountered.

Breast cancer and breast diseases screening programs should be developed at the hospitals. These programs should ideally include clear objectives, plans and managements. Programs should be free of cost, to encourage large number of women to enroll in such screening programs.

## CONCLUSION

Benign breast diseases are the commonest breast diseases, in which fibroadenoma is the most common variety. Patients normally present late with locally advanced diseases due to lack of awareness, knowledge and dearth of organized screening programmes.

With the increase use of mammography, more and more women are diagnosed with benign and malignant breast diseases.<sup>25</sup> Identification of benign lesions simulating malignancy and premalignant lesions is important for follow up of cases. It is important to distinguish between benign and malignant lesions like phyllodes tumour as approach to diagnosis and management differs.

Invasive breast carcinoma is associated with a high mortality rate due to invasion in lymph nodes, adjacent tissues and due to metastasis. Invasive ductal carcinoma is the most common histological type with a poor prognosis rate of 30-35% 10-year survival rate. Peri-tumor lymphatic and blood invasion are the main factors related to presence of metastasis to lymph nodes and they are more closely related to tumor size and histological grade.<sup>26</sup> Histopathology plays an important role in the diagnosis of breast diseases. When correlated with clinical data, mammographic findings, breast ultrasonography and fine needle aspiration cytology, the histopathological examination can lead to the early diagnosis of an occult malignant breast lesion. The need of the hour is to launch breast cancer awareness campaign and screening



programmes at the local and national level so that breast cancer can be diagnosed and cured at the earliest.

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**Conflict of interest:** None

**Ethical clearance:** Done

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ORIGINAL PAPER

# High Prevalence of Intestinal Helminthiasis in a Densely Populated Urban Informal Settlement from Northeast India

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## ABSTRACT

*Helminthic infection is a common yet much neglected problem worldwide. Just like any underdeveloped/developing region, prevalence of this infection in North Eastern part of India is suspected to be high. This is so, given the fact that slum like area with unhygienic living condition, where geo-helminths thrives especially in children, are in existence in urban areas here. Yet no published data, to the best of our knowledge, on this condition is available from this region. About 93 stool samples from under five children were collected from a thickly populated underserved urban informal settlement situated in the heart of an North-East-Indian City. Samples were processed at a tertiary care teaching Institute for detection of parasitic elements employing standard microbiological techniques. 52.7% samples yielded helminthic ova and significant proportion (42% of total detection) were with multiple parasitic infections. Statistically significant association could be found between helminthic infection as well as factors like mother's education (lack of it), absence of filtration or boiling in drinking water, age more than 2 years etc. Predominant detectable helminths were *Ascaris lumbricoides* (43% cases) and *Trichiuris trichiura* (30% cases) besides few other parasites. An overall need of improvement in sanitation, deworming and health education to the susceptible people seemed to be the need of the hour.*

**Keywords:** Helminths, Geo-helminths, Helminthiasis, Slum area, Slum-like area, informal settlement, Ascariasis, Round worm, Trichiuriasis, Whip worm, Hookworm, under 5 children, Enterobiasis

## INTRODUCTION

Parasitic infections, especially helminthic infection in the intestine are amongst the commonest infectious disease, especially in less developed part of the world. Some 3.5 billion people are estimated to be affected, while 450 million are clinically ill, majority being children, as a result of this problem.<sup>1,2</sup> Area of major concern are resultant iron deficiency anemia, growth retardation in children and other physical and mental health conditions, all of which are public health issues especially in underdeveloped countries.<sup>2,3,4,5</sup> The prevalence of these infections is presumed to be connected with poverty, poor hygiene, lack of education, inadequate health services, etc.<sup>6,7</sup>

The feco-oral route is significant in the transmission of helminthic infections to human via poor personal hygiene and environmental conditions, principal incriminating factors being contaminated soil and water sources.<sup>1</sup>

Older global estimates of prevalence of intestinal helminthiasis, {e.g. Chan et al (1997) with 24% *Ascaris*

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*lumbricoides*, 17% *Trichuris trichiura*, 24% hookworms, etc.) are believed to remain more or less unaltered, especially in under developed regions.<sup>1,2</sup> This is despite advances in technology, emergence and re-emergences of newer agents, world ecology, human demography and human behavior. Lack of recognition of these agents partly may be attributable to lack of any serious illness, excepting rare occurrences of *Ascaris* induced intestinal obstruction or *Trichuris* dysentery syndrome.<sup>1,2</sup> However when all the disability consequences are considered together, it is the nonspecific effects on moderately infected people that carry the higher overall disease burden. (As measured by DALY or Disability Adjusted Life Years estimates).<sup>1,2</sup>

In India, disadvantaged children are the most affected, especially those who live in slum areas.<sup>8,9</sup> World Health Assembly (administrative wing of health related issues within World Health Organization) member states were urged to implement regular, non selective deworming of school age children and young women in areas where the prevalence of worm infestation is 50% or more.<sup>10</sup> Currently, published data regarding the prevalence of parasitic infections or helminthic infection from North Eastern part of India about very much scarce. Hence little information is available in the current scenario of this infection locally. The study was carried out to fill that gap. The aim of this study was to determine the prevalence of intestinal helminthiasis in under five years age group of a densely populated and under-serviced urban informal settlement in the heart of Guwahati City.

## MATERIAL AND METHODS

This study was carried out from February 2008 to July 2008 in a densely populated, underserviced informal human settlement on either side of the main railway track of Guwahati city. Subjects were continuously selected from each and every possible consenting household containing under five years age children. All children on breast feeding were excluded from the study.

Socio-economic and epidemiologic data were collected by means of a structured questionnaire, which mainly covered areas like (i) socio-demographic data: age, sex and residence; (ii) environmental factors: Occupation and education level of the parent's, number of rooms and people in the house, if there was any toilet (& type) in the house, household water source and hygiene practices (washing of hands after using toilet); (iii) personal

complaints if any: Lack of appetite, abdominal pain/distention, perianal itching and history of parasitic infections and treatment, etc.

All children were evaluated by standard anthropometric measurements (weight, height or recumbent length, mid-arm circumference) to find out the presence of Protein Energy Malnutrition as defined elsewhere.<sup>11</sup>

A stool collection container with the name of the selected subject was handed over to the guardian for stool collection and in the next-day our team member carry it to the Dept. of Microbiology, preferably within 2 hours of defecation.

Specimen were processed for direct saline mount as well as concentrated by the sedimentation technique of Formol Ethyl Acetate technique as per standard recommendation.<sup>12,13</sup> After concentration a drop of sediment was examined by placing a cover slip over it. One Microbiologist and an experienced technician examined the preparations under 10X and 40X dry objective (with 10X eye piece) and recorded the results with mention of type (ova, Proglottids, etc.), number (no/hpf), species etc. Quality control was ensured by split sampling and parallel staining of known positive samples of fecal parasites.<sup>12,13</sup>

Significance between the prevalence of intestinal parasites and socioeconomic status (as well as other relevant factors) was determined using standard statistical methods like Fisher's exact test for estimation of two tailed p-value, etc.

## RESULTS

Out of 131 subjects fulfilling inclusion criteria, 93 provided stool samples among which 42 were males and 51 females (**Table 1**). Mean age of participants were 3 years.

**Table 1** Salient feature of subjects

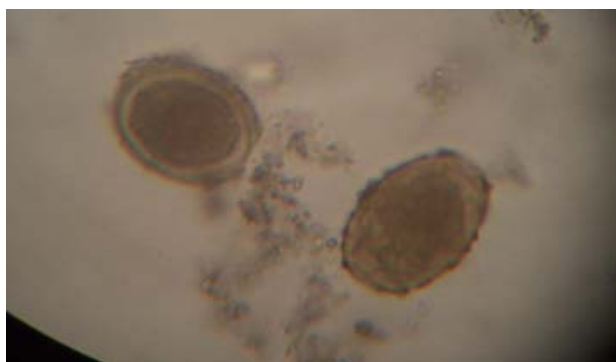
Feature	Numbers	comment
No of participants	131	Male: 69 Female: 62
Participants providing stool sample	93	Male: 42 Female: 51
Stool samples showing ova of helminthes	49/93	Male: 23 Female: 26
Single helminthic ova detected in	28 samples	28/49
Double helminthes detected in	18 samples	18/49
Triple helminthes detected	3 samples	3/49

Out of 131 total respondents, stool sample could be collected from 91 subjects. In about 49 (49/93) stool samples, parasitic elements (all in the form of Ova) could be detected with infection rate being 52.7%. There were 21 cases (21/49, i.e. 42.9%) with poly-helminthic (2 or 3 parasites in same host) infection (**Table 1**).

**Table 2** Profile of helminthes detected  
(all in the form of ova)

Helminth & Combination	Positive Samples	Male: Female ratio (Subject population)
<i>Ascaris lumbricoides</i>	19	9:10
<i>Trichuris trichiura</i>	7	5:2
Hook worms	1	0:1
<i>Enterobius vermicularis</i>	1	0:1
<i>Ascaris lumbricoides</i> + <i>Trichuris trichiura</i>	18	9:9
<i>Ascaris lumbricoides</i> + Hookworm+ <i>Trichiuris trichiura</i>	2	0:2
<i>Ascaris lumbricoides</i> + <i>Enterobius vermicularis</i> + <i>Trichiuris trichiura</i>	1	0:1

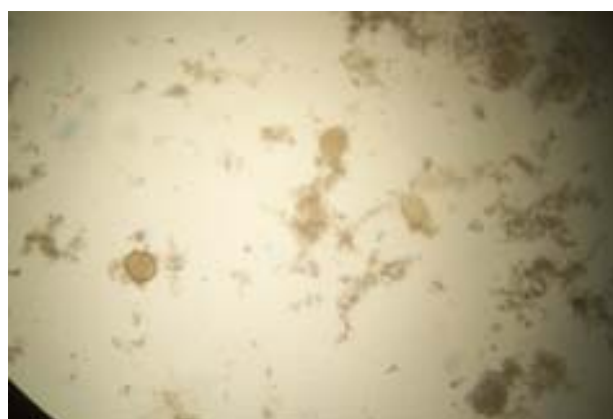
**Table 2** vividly depicts the profile of parasites detected. *Ascaris lumbricoides* emerged as the predominant helminth i.e. 19 in single detection and 21 as part of poly helminthiasis cases implying a total 40 detection out of 49 positive samples (**Figure 1, 2, 3, 4**). Overall prevalence was 43% (40/93). Similarly *Trichuris trichiura* (eggs in **Figure 5, 6**) was second with 7 in single parasite detection cases and 21 in poly-parasitoses cases (total 28 out of 49 cases). Prevalence rate was estimated to be 30% for this helminth. Few cases of Hook worm (**Figure 7**) and *E vermicularis* were also detected.



**Figure 1** Roundworm: *Ascaris lumbricoides* (multiple eggs in 40X objective)



**Figure 2** Roundworm single egg (40X objective)



**Figure 3** Multiple *Ascaris* egg in same field: Severe infection (10X objective)

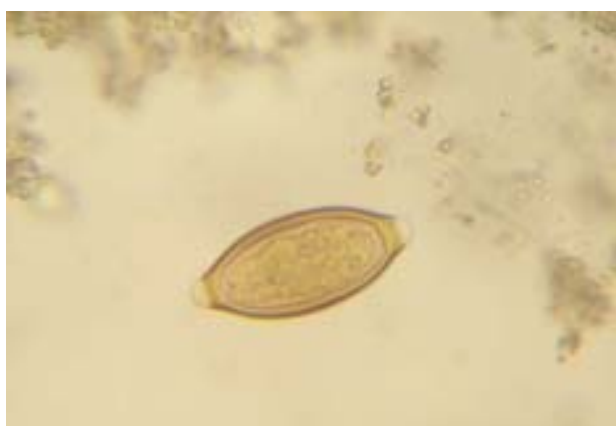


**Figure 4** Unfertilized *Ascaris lumbricoides* egg (40X)





**Figure 5** *Trichuris trichiura* (whip worm egg) (40X)



**Figure 6** Whipworm egg (40X)



**Figure 7** Hookworm egg (40X)

**Table 3** Socioeconomic and other factors

	No of Cases (Tested)	Positive	Negative	Percentage	P-Value
Age					
Below 2 yrs	21	5	16	23.8	0.0031
≥2 – 5 yrs	72	44	28	61.1	
Sex					
Male	42	23	19	54.8	0.8351
Female	51	26	25	51	
Mother's education					
Educated (primary school completed or above)	32	8	24	25.8	0.0002
Un-educated: (illiterate or some school)	61	41	20	67.2	
Family size					
≤4	29	13	16	44.8	0.3722
≥5	64	36	28	56.3	
Excreta Disposal					
Home	15	7	8	46.7	0.7788
Open air/other	78	42	36	53.8	
Filtration/boiling of Drinking water					
Yes	18	4	14	22.2	0.0073
No	75	45	30	60.0	

Different socioeconomic and socio-demographic factors were analyzed for statistical significance with helminthic infection. Fisher's exact t-test was utilized and two-tailed p-value was calculated for checking the significance. Table 3 clearly shows statistically significant relation between helminthic infection and factors like age group above 2 years, uneducated mother, absence of filtration or boiling of drinking water, etc. Factors like unhygienic excreta disposal, large family size, etc., came out to be statistically non-significant.

An important finding of the study was the presence of Poly-helminthiasis in quite a number of samples (21/49 i.e. 42.9%).

## DISCUSSION

This study revealed that 52.7% of the subject population is infected with intestinal helminths predominantly *Asacris lubricoides* and *Trichuris trichiura*. Given this rate of prevalence and extreme unhygienic condition of the dwellers, it could be a potential source of intestinal helminthiasis in other population as well. This rate is quite high compared to studies like Awasthi et al.<sup>8</sup> with 17.5% from Lucknow, Chhotray et al.<sup>14</sup> with 25.92% from few suburban Indian locality and Okyay et al.<sup>2</sup> with 31.8%. On the other hand higher rates were observed by Wani et al.<sup>9</sup> with 71.5% at Kupwara district of Punjab, Zulkifli et al.<sup>15</sup> and Naxsana et al.<sup>16</sup>.

It was found in the study that 30.1% (28/93) were infected by single helminthic parasite and 22.6% (21/93) were infected by multiple helminth parasites. Similar finding was recorded by Wani et al.<sup>9</sup>, Lindo et al.<sup>17</sup> and Legesse et al.<sup>18</sup>

The results of this study indicate that *A. lumbricoides* was the commonest helminth parasite in both male (42.9% i.e. 18/42) and female (43.1% i.e. 22/51) children, followed by *Trichuris trichiura* 31% (13/42) in male and 27.5% (14/51) in female children. This may be due to the presence of the source of the infection in the area studied and frequent faeco-oral spread of infection among children. In addition, contamination of soil by human faeces (especially for *Ascaris* and *Trichuris*) in combination with a high degree of overcrowding and a low-income level increases the susceptibility to helminthiasis. Similar results were shown by Wani et al.<sup>9</sup> in Punjab, Al-Nakkas et al.<sup>19</sup> and Lindo et al.<sup>17</sup>

This study shows a significant rate of infection in above two years age group, which corroborates well with many other studies done earlier e.g. Muniz-Junqueira et al.<sup>20</sup>, Zulkifli et al.<sup>15</sup> etc. Factors like late age of weaning, habit of eating soil, playing out of household, etc., may be some explanation. Though stool samples could be collected more from female (than male), there was no significant association with sex of the subject and helminthic infection. This study shows nearly two thirds of the mothers dwelling in informal urban settlement were uneducated /illiterate, a fact having a significant bearing in intestinal helminthiasis. Excreta disposal practices were found to be predominantly (more than two third cases) unhygienic and family sizes were largely big (more than 5). Ulukanligil et al found that more than 90% cases belonged to low socio-economic group and more than

70% of mothers were illiterate.<sup>21</sup> Okyay et al studied related factors of intestinal parasitoses in children of Turkey, and found that 42.6% children with parasite infection had illiterate mother.<sup>2</sup>

All the children included this study had malnutrition of varying degrees. When we tried to take account of use of filtered or boiling water for drinking purpose, situation was very dismal as more than 80% respondents replied negative. Lack of education and awareness could be the reason. This phenomenon was significantly associated with helminthic infection. The data of Zulkifli et al revealed that parasitic infection is significantly lower in children using piped water (60%) compared to other sources (76%).<sup>15</sup> Similar findings was noted by different other authors, e.g., Oberhelman et al; Ulukanligil et al, etc.<sup>22, 21</sup> Though no statistically significant relation between source of drinking water and parasitic infection was found by Okyay et al.<sup>2</sup>

Hookworm detection was very less as was the case with *Enterobius vermicularis*. With better sampling (e.g. perianal swab) and collection technique (avoiding delay) detection rate could have been enhanced.

**Limitation of the study:** Low sample size as well absence of relevant specimen like perianal swabs (for *Enterobius vermicularis*, etc.) were two major limitation of the study.

## CONCLUSION

This was a preliminary attempt mainly targeting to identify the problems and difficulties faced in carrying out such a study in a more organized and bigger way (e.g. with a larger sample size in a registered or organized slum area). Despite all its limitations and hurdles, the study generated some useful data which can be of help to health officials in policy developments, interventions such as de-worming measures and health education.

**Conflict of Interest:** None

**Ethical Clearance:** Obtained

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# A Comparative Study of Blood Glucose Level Amongst the Normal Birth Weight and Low Birth Newborns

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## ABSTRACT

The aim of the study is to estimate serum glucose level in normal birth weight or adequate for gestational age (AGA) and low birth weight or small for gestational age (SGA) newborns and to observe incidence of hypoglycaemia in SGA newborns within first 24 hours after birth. A cross sectional study was carried out for 1 year. 32 LBW (SGA) newborns and 49 NBW (AGA) newborns were taken for the study. Newborns weighing <2.5kg were taken as LBW. Preterm baby, baby of diabetic and toxemic mother, twins and baby of birth weight <1.5kg were excluded. Blood sugar investigation was done at different time period for the first 24 hour. Four sample of each newborn was taken for investigation. A little amount of umbilical cord blood obtained from the cut end of the cord, was the first sample taken at zero hour. Then next sample was taken at 2<sup>nd</sup> hour after the initial feed, then again before feeding at 6<sup>th</sup> and 24 hours after birth respectively. The method used is Glucose Oxidase method. To make a comparison of blood glucose level in both NBW and LBW newborns, the P values are calculated by using Z test. The operational threshold for hypoglycaemia is currently believed to be a blood glucose value of <40 mg/dl, From my study it is found that in both the groups of newborns, lowest blood glucose value is found at the 2<sup>nd</sup> hour and the highest number of newborns having low blood glucose value is found at the 2<sup>nd</sup> hour. The mean serum glucose values of SGA babies were less than that of AGA babies at zero, 2<sup>nd</sup>, 6<sup>th</sup> and 24<sup>th</sup> hour after delivery and the difference is significant. From my study it can be concluded that determination of blood glucose in those newborns which are at greater risk for developing hypoglycaemia in first

24 hours of life is very important as prolonged neonatal hypoglycaemia is associated with a risk of long term neuro-developmental sequelae.

**Keywords:** Hypoglycaemia, adequate for gestational age, small for gestational age, glycogenolysis, gluconeogenesis

## INTRODUCTION

Glucose is the major source of energy for foetus and neonate. It is an immediate source of energy. A total 38 moles of ATP is formed for each mole of glucose metabolized by the cells.<sup>1</sup>Upto 90% of total glucose used is consumed by the brain. The usual rate of glucose utilisation is 4-8 mg/kg/minute.<sup>2</sup> Glucose passes to the interior of the cells by the mechanism of facilitated diffusion. The amount of glucose that can diffuse to the inside of the most cells of the body in the absence of insulin, with the exception of liver and brain cells, are far too little to supply the amount of glucose normally required for energy metabolism.<sup>1</sup> It means cerebral glucose uptake is dependent on blood glucose concentration, not on insulin. Glucose regulatory mechanisms are sluggish at birth. Hypoglycaemia is said to develop when serum

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glucose concentration in full term infant is <30 mg/dl as the plasma glucose concentration observed in relatively large population of healthy full term infants, >1.7 mmol/L (>30 mg/dl) in the first 24 hours of life and >2.5 mmol/L (>45 mg/dl) after 24 hours.<sup>3</sup> But the operational threshold for hypoglycaemia is currently believed to be a blood glucose value of <40 mg/dl. Small for gestational age babies are the risk factor for neonatal hypoglycaemia. SFD or LBW babies develop hypoglycaemia due to decreased tissue glycogen stores, decreased gluconeogenesis, hyperinsulinism, increased glucose needs of hypoxia, hypothermia and large brain. Chronic foetal glucose deficiency in IUGR foetuses leads to cell cycle arrest of the pancreatic  $\beta$  cells and less secretion of insulin.<sup>7,8</sup> Chronic glucose deprivation in the IUGR foetus produces competing metabolic changes of increased capacity for glucose utilization and a tendency to hypoglycaemia. Hypoglycaemic infants may not always be symptomatic. Therefore routine monitoring for at risk infants is mandatory.

**Screening:** Low birth weight babies are prone to develop hypoglycaemia especially in first 24 hours of life, as transition from intrauterine glucose regulation to extra uterine adaptation develops in first 24 hours of age.<sup>10</sup> So blood test for glucose level is done in zero, 2<sup>nd</sup>, 6<sup>th</sup> and 24 hours after delivery.

## MATERIALS AND METHOD

A cross sectional study was carried out in the department of physiology of Gauhati Medical College. A total of 81 term newborns were taken out of which 49 were NBW and 32 were LBW. Birth weight is defined as normal birth weight with weight between 2.5 kg and 3.9 kg and low birth weight with weight < 2.5 kg. The term AGA and SGA were defined according to intrauterine growth curves based on percentile of birth weight.<sup>11</sup> Thus newborns were taken between 1.5 – 3.9 kg body weights and delivered between 37 completed weeks and 42 weeks of gestation. A simple random sampling method was followed. Newborns were taken from obstetrics and gynaecology, and paediatric department.

**Exclusion Criteria:** Preterm baby, baby of diabetic and toxemic mother, twins and baby of birth weight <1.5 kg were excluded.

A detailed history including maternal history and history on delivery was taken. Examination of baby was done to

see the weight and for signs of hypoglycaemia.<sup>12</sup> Blood sugar investigation was done at different time period for the first 24 hours. Four venous blood samples of each newborn were collected. The first sample which was taken from the cut end of the umbilical cord immediately after delivery was taken as zero hour. Then next sample was taken at 2<sup>nd</sup> hour after birth, after the initial feed, then again before feeding at 6<sup>th</sup> & 24<sup>th</sup> hour after birth. The method used is Glucose Oxidase Method. Sample blood was allowed to clot at room temperature, undisturbed for half an hour. When the blood firmly clotted, and started to retract, the sample may be left in a refrigerator overnight at four degree centigrade, so that the clot retraction was complete and unfavourable for the growth of bacteria. If there is delay in refrigeration then the glucose level of the sample may drop at a rate of 15 -20 mg / 100 ml /hr. In some samples the clot fails to retract, it was then gently detached from the sides of the vial with a platinum wire. Extreme care was taken to prevent haemolysis. Serum obtained was straw coloured, undiluted and was transferred to fresh plastic vial. It was then subjected to centrifugation at 3000 rpm for 15 min. The samples obtained were strictly labelled; hence it was ready for final glucose estimation by Glucose Oxidase Method.

## RESULT AND OBSERVATION

**Table 1** shows the difference in serum glucose level in different time period. From the table it is seen that serum glucose level is lowest in 2<sup>nd</sup> hour and the mean glucose values (mg/dl) of 81 newborns are within 95% confidence interval.

**Table 1** Comparison of serum glucose level (mg/dl) of newborns according to different time period

Time Period (Hours)	Serum glucose level (mg/dl)		
	Mean	S.D.	95% C.I.
0	65.06	14.40	36.26,- 93.86
2	48.67	13.19	22.29, 75.05
6	54.78	13.57	27.64, 81.92
24	73.89	16.75	40.39, 107.39

**Table 2** shows the lowest blood glucose level in different time period in first 24 hours of life. Overall prevalence of hypoglycaemia is 70 out of 81 term newborns in first 24 hours of life. From this table it is seen that the maximum number of low blood glucose value, which is < 40 mg/dl is seen after 2<sup>nd</sup> hour of delivery.

**Table 2** Number of newborns having lowest blood glucose level during the first 24 hours

Time period (hours)	No. of newborns	
	Blood glucose values <40 mg/dl	Blood glucose values <30 mg/dl
0	6	1
2	42	1
6	22	0
24	No	No

**Table 3** shows the difference in mean serum glucose level between NBW (AGA) and LBW (SGA) by different time period. From this table it is seen that, the mean serum glucose value of LBW babies at zero, 2<sup>nd</sup> and 6<sup>th</sup> hour is less than that of NBW baby, which is statistically significant as  $P < 0.05$  but it is highly significant after 2<sup>nd</sup> hour.

**Table 3** Comparison of mean serum glucose levels amongst the newborns of AGA and SGA by different time periods

Time period (hour)	Serum glucose level (mg/dl) of AGA of babies (n=49)		Serum glucose level (mg/dl) of SGA of babies (n=32)		z-value
	Mean	S.D.	Mean	S.D.	
0	72.65	16.60	53.44	10.40	6.40
2	55.77	15.90	37.80	7.59	6.81
6	60.35	15.40	46.26	10.40	4.91
24	80.46	17.90	63.84	15.09	4.49

## DISCUSSION

Neonatal hypoglycaemia is a common metabolic disease<sup>13</sup> because of inability to maintain glucose homeostasis. The overall prevalence depends on birth weight, gestational weight, and intrauterine growth retardation. Symptomatic hypoglycaemia is not common (1- 3 per 1000 live births) as against chemical hypoglycaemia (67% in preterm small for gestational age to 4% in term appropriate for gestational age).<sup>14</sup> Undiagnosed hypoglycaemia can have long term neurological consequences; thus the emphasis is on prevention and early detection along with treatment of asymptomatic hypoglycaemia. From table 1, it has been observed that serum glucose level is 48.67 mg/dl in 2<sup>nd</sup> hour of life, which is the lowest level in the first 24 hours. So, from my study it can be said that in 2<sup>nd</sup> hour of life glucose production in the body is low.<sup>15</sup> Studies using radioisotope tracer techniques in humans<sup>16</sup> have demonstrated that

the fatal glucose supply is derived from the mother with no endogenous glucose production in the fetus. The time of birth is marked by an abrupt change from a high carbohydrate low fat diet to a high fat low carbohydrate diet.<sup>17</sup> So the neonate must make the transition from an environment of continuous glucose supply from the placenta to one of the intermittent periods of feeding and fasting.

From **Table 2**, it has been observed that the number of newborns having blood glucose value < 40 mg/dl is 6, at zero hour, which reflect maternal blood glucose level, 42 at 2<sup>nd</sup> hour before feeding, and 22 at 6<sup>th</sup> hour and no case of hypoglycaemia found after 24 hours. It means maximum number of low glucose value is seen in 2<sup>nd</sup> hour. After 2<sup>nd</sup> hour blood glucose level gradually increases. So from my study it can be assumed that low blood glucose level in 2 - 3 hours of life is physiological<sup>18,19</sup> and that the newborn has unique physiologic adaptation to low blood glucose level.<sup>20,21</sup> This metabolic adjustment occurs, when the blood glucose value falls to a level, which is unable to fulfil body's requirements. The body makes glucose available in the fastest state by counter regulation, which occurs either by glycogenolysis or gluconeogenesis. Counter regulatory hormones become important if blood glucose level continue to fall: glucagon release is stimulated followed by release of epinephrine, cortisol<sup>22</sup> and growth hormone.<sup>23</sup> Epinephrine and Glucagon both increase cAMP in hepatocytes which activate protein kinase A, which causes increase glycogen breakdown and also inhibit glycogen synthesis.<sup>24</sup>

**Table 3** shows that mean serum glucose value in LBW (SGA) baby is lower than NBW (AGA) baby at zero, 2<sup>nd</sup>, 6<sup>th</sup> and 24 hours of delivery. Several studies show that SGA infants when compared to AGA infants have increased plasma concentration of lactate and alanine with in first 24 hours of life.<sup>25</sup> After that these substrates fall and become lower than AGA infants. The elevated concentration of gluconeogenic substrates reflect delayed maturation of gluconeogenic pathways in SGA infants due to delay in the development of a rate limiting hepatic gluconeogenic enzyme.<sup>26</sup> SGA newborns have greater brain weight.<sup>27</sup> In SGA babies liver weight is much reduced whereas brain weight remains within normal limits, so that the ratio of brain weight to liver weight is > 5. This discrepancy in the size of the utilize that is brain and liver that is liver glycogen of glucose causes low glucose values leading to hypoglycaemia.

## CONCLUSION

So, from my study it can be concluded that determination of blood glucose in newborns which are at greater risk for developing hypoglycaemia in the first 24 hours of life, mainly LBW (Small for date baby) is very important. Others who are also at risk for developing hypoglycaemia are preterm babies, moderate to severely asphyxiated babies, babies of diabetic mothers and toxemic mothers. Asymptomatic hypoglycaemias which develop in the first 24 hours of life are mainly physiological. Management of hypoglycaemia by feeding is widely used for asymptomatic hypoglycaemia which is usually successful. The most effective method of preventing hypoglycaemia is early breast feeding. Early intervention by early diagnosis of hypoglycaemia subsequently prevents brain damage or, any neurological complication decreasing the number of physically disabled children in our country. So, an approach aimed at reliable detection of hypoglycaemia at risk, prevention and appropriate treatment is very essential.

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**Ethical clearance:** Taken

**Conflict of interest:** None

**Contribution of Authors:** We declare that author(s) named in this article did this work and all liabilities pertaining to claim relating to the content of this article will be borne by the authors. The study was conceived and designed by Dr. Chinmayee Sarma Bhargav, who also collected and analyzed the data. Dr. Biju Dutta Choudhary, Dr. Dulal Kalita, Dr. Ankumoni Saikia and Anjanamoyee contributed to analyze the data and designing the manuscript.

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## Academic Excellence of Founder Member of IJHRMLP



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ORIGINAL PAPER

# Knowledge, Attitude and Practices of Staff Nurse on Hand Hygiene in a Tertiary Medical Care

**Borah Rashmi Rekaha<sup>1</sup>, Das Krishna<sup>2</sup>**

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## ABSTRACT

*A cross sectional descriptive study was conducted in Gauhati Medical College and Hospital, Guwahati to assess the knowledge, attitude and practice of nursing staff on hand hygiene. A sample of 100 nursing staff was selected by purposive random sampling technique. The tool used for the study was structured interview schedule consisting of socio demographic characteristics, knowledge questionnaire, attitude measurement using likert scale, practice assessment.*

*The result revealed that majority of the nursing staff of 42% do not have an adequate knowledge and only 24% have adequate knowledge. With respect to attitude of nursing staff towards hand hygiene it is found that majority (27%) of nursing staff have unfavourable attitude towards hand hygiene and only 19% staff nurse have favourable attitude towards hand hygiene. On basis of practice it is found that majority (33%) do not practice correct hand hygiene techniques/methods and only 7% of nursing staff practice satisfactorily the correct techniques of hand hygiene. The findings of the present study demonstrated that there is a need to increase the awareness among the staff nurses regarding hand hygiene to prevent cross infection and related mortality in the hospital. The findings could be utilized as a basis for conducting training programme targeting hand hygiene practices for the staff nurses with continuous monitoring and performance feedback, so that they develop current knowledge in the area with a behavioural change in attitudes and practices leading to reduction of nosocomial infection.*

**Keywords:** Staff nurse, hand hygiene, knowledge, attitude, practice

## INTRODUCTION

Infection caused due to hospital acquired microbes is an evolving problem worldwide, and horizontal transmission of bacterial organisms continues to cause a high nosocomial infection rate in health care settings. Nosocomial infections due to poor hand hygiene are a major cause of increasing morbidity, mortality and health care costs among hospitalized patients worldwide.<sup>1</sup>

The high prevalence of these infections, as high as 19%, in developing countries poses a challenge to health care providers.<sup>2</sup> Hand hygiene is considered as the single most cost-effective public health measure for preventing health care associated infection (HCAI).<sup>3</sup>

Transmission of healthcare-associated pathogens generally occurs via the contaminated hands of healthcare workers often transmitting virulent and multi-drug resistant strains. Though preventable with a simple hand washing, health care workers are reluctant to adopt recommended practices to curb these infections.<sup>4</sup>

Although the World Health Organisation (WHO) has issued guidelines for procedural hand washing in order to reduce the prevalence of hospital associated infections but lack of knowledge amongst health care workers is associated with poor compliance.<sup>5</sup>

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Despite evidence and expert opinion that hand hygiene reduces transmission of potential pathogens or antimicrobial-resistant organisms, sustained improvements in adherence to hand hygiene recommendations and proper hand washing technique among health care workers are uncommon<sup>6</sup>, even after educational efforts. At the same time, in some hospitals there is not even proper training the employees regarding hand hygiene practices. This is shown by the lack of even basic awareness about hand washing guidelines among the hospital personnel.

Nurses constitute the largest percentage of the health care workers<sup>7</sup> and they are the “nucleus of the health care system”,<sup>8</sup> because they spend more time with patients than any other HCWs, their compliance with hand washing guidelines seems to be more vital in preventing the disease transmission among patients. Many studies have consistently shown that improved hand hygiene has reduced nosocomial infections and cross contamination of multi resistant infection in hospitals.<sup>9</sup>

In Asia there is a paucity of studies<sup>10</sup> exploring this subject, although the prevalence of health care associated infections is high in this region; especially medical and nursing staff's knowledge of standard precautions is rarely compared.<sup>11</sup> The observance of hand hygiene by nursing staff is reported as being weak.<sup>12, 13</sup> Therefore, it is absolutely essential to investigate and know nurse's knowledge, attitudes and practices about hand hygiene so that appropriate strategies can be developed to promote hand hygiene compliance in the hospital. With this background, the present study was undertaken by the researcher.

## OBJECTIVES

The present study attempted: (i) To assess the level of knowledge of staff nurses on hand hygiene, (ii) To measure the attitude of staff nurses towards hand hygiene and (iii) To identify the practice of staff nurses on hand hygiene.

## METHODOLOGY

A cross sectional descriptive survey approach was used for the study. The study was conducted in Gauhati Medical College and Hospital, (GMCH) Guwahati. The population consisted of staff nurses working in GMCH. The sample size was 100 staff nurses who were selected through systematic random sampling technique.

## The tool used for data collection consists of the following:

### *Part 1: Demographic characteristics*

A demographic characteristic includes age, religion, marital status, professional qualification and experience in years.

### *Part 2: Level of knowledge of staff nurses on hand hygiene*

This part includes 10 multiple choice questions related to hand hygiene

### *Part 3: Measurement of attitude*

This part includes 3 point likert scale with 10 items which the subject has to respond under agree, neutral, disagree,

### *Part 4: Level of practices*

This part includes 10 items to which the subjects have to response as yes/no.

## OBSERVATION AND RESULTS

All the items in the tools were coded and transferred to a master sheet for computer programming. Statistical analysis has been performed by using SPSS software version 20.0 to analyse the data. Frequency and percentage distribution was used to describe the demographic, variables, knowledge; attitude and practice of staff nurses on hand hygiene.

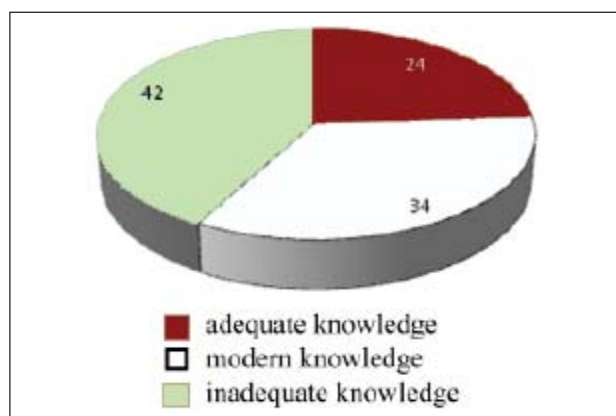
## DEMOGRAPHIC CHARACTERISTICS

Analysis of demographic data revealed that majority of staff nurses (55%) were in the age group of 36-45 years followed by 23 % in the age group of 26-35 years, 16% were in the age group of 46 years and above and only 6% were less than 25 years.

In relation to religion of staff nurses majority (61%) were Hindus, 37% were Muslims and only 2% were Christians. Majority of staff nurses (86%) were married and 14% were unmarried. With respect to professional qualifications majority (73%) were GNM, 24% were B.Sc. nurse and only 3% were M.Sc. nurse. In case of working experience majority of (69%) staff nurse were having 6 and above years of working experience, 25% were having 2-5 years of working experience and only 4% staff nurses were having less than 2 years of working experience.

From **Figure 1** it is observed that majority (42%) of staff nurses do not have adequate knowledge on hand hygiene followed by 34% have moderate knowledge on hand

hygiene and only 24% staff nurses have adequate knowledge on hand hygiene.



**Figure 1** Distribution of knowledge of staff nurse on hand hygiene

The attitude of staff nurse was assessed by 3 point attitude scale consisting of 10 items. The maximum score was 27 and minimum score was 10. According to the total score obtained by each subject the attitude was classified into three categories.

**Unfavourable attitude:** Mean- 1SD (19.48-4.35=15.13)

**Favourable attitude:** Mean – 1SD to Mean +1SD

**Most favourable attitude:** Mean +1SD (19.45+4.35=23.83)

**Unfavourable attitude** = <15 score

**Favourable attitude** = (15-24)

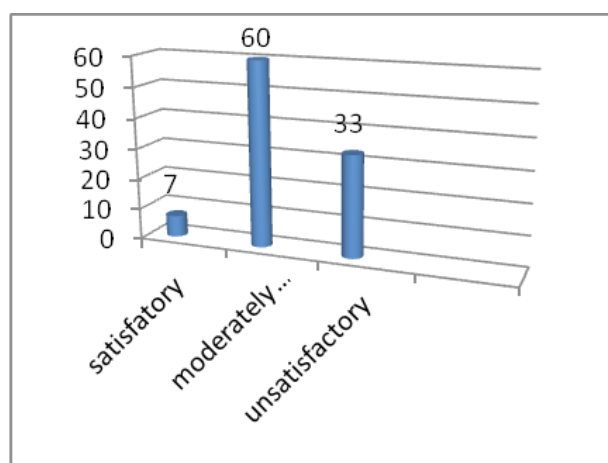
**Most favourable attitude** = >24 score.

Majority (54%) of staff nurses carries moderately favourable attitude towards hand hygiene, 27% carries unfavourable attitude towards hand hygiene and only 19% staff nurse have a positive/favourable attitude towards hand hygiene (**Table 1**).

**Table 1** Frequency distribution and percentage of attitude of staff nurse's towards hand hygiene (N=100)

Attitude Score	Frequency	%
Favourable (>24.)	19	19%
Moderately favourable (15-24)	54	54%
Unfavourable (<15 )	27	27%
Total score	100	100%

**Figure 2** represents the practice level of staff nurse on hand hygiene which interprets that majority (60%) of staff nurse moderately practice hand hygiene whereas only 7% practice hand hygiene satisfactorily and 33% do not practice hand hygiene satisfactorily.



**Figure 2** Distribution of practice level of staff nurse on hand hygiene

## DISCUSSION

The current study revealed that majority (42%) of staff nurse do not have adequate knowledge on hand hygiene followed by 34% which have moderate knowledge on hand hygiene and only 24% staff nurse have adequate knowledge on hand hygiene. Similar findings were observed by Srujith Sasidharan Nair, Ramesh Hanumantappa, Shashidhan Gurushantwamy Hiremath, et al<sup>14</sup> where only 9% of participants (13 out of 144) had good knowledge regarding hand hygiene.

In the present study it is found that majority (54%) of staff nurse carries moderately favourable attitude towards hand hygiene, 27% carries unfavourable attitude towards hand hygiene and only 19% staff nurse have a positive/favourable attitude towards hand hygiene. Shinde MB, Mohite VR<sup>15</sup> reported similar findings that majority of staff nurses in tertiary care hospital at Karad had poor attitude towards hand hygiene.

The present study is consistent with the study findings of Harris A, Nafziger R, Samore M, DiRosario K, Roghmann M, Carmeli Y<sup>16</sup> which revealed that practice level of staff nurses on hand hygiene is not satisfactory.

## CONCLUSION

This study clearly demonstrates that staff nurses are still lagging behind in their knowledge regarding hand hygiene and not aware of the current updates on hand hygiene. They do not have a positive attitude towards hand hygiene and therefore do not practice it, which calls for urgent training or conducting of in-service educational

programme for the staff nurses on hand hygiene. This in turn will reduce the incidence of hospital acquired infection and associated mortality and morbidity in the hospitals.

**Ethical Clearance:** Done

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# HPV Subtype 16 and 18 Distribution Among Young Sexually Active Women with Vaginal Discharge or Cervical Lesion

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## ABSTRACT

*Objective: To study the prevalence of HPV infection and common subtypes 16 and 18 in young sexually active reproductive age group females with vaginal discharge or cervical lesion and to know the other determinants of HPV infection. Methods: Total 110 sexually active reproductive age group female with vaginal discharge or cervical lesion were included in the study and dry paper smear of cervical scraping were collected for HPV DNA testing by PCR. Results: The prevalence of HPV is 9.09%, HPV 16 is 3.64%, HPV 18 is 0%. Conclusion: The present study also shows significant association of HPV infection with younger age, early initiation of sexual activity, associated symptoms like white discharge or irregular vaginal bleeding, H/O other sexually transmitted infections and abnormal pap smear report.*

**Keywords:** Human papilloma virus (HPV), deoxyribonucleic acid (DNA), polymerase chain reaction (PCR)

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Cervical cancer affects approximately 1.4 million women worldwide and claims an estimated 239000 lives each year. Over 99% of cervical cancer cases result from genital infection with human papillomavirus (HPV). The disease represents a major health inequity, as 80% of those with cervical cancer live in developing countries. An estimated 660 million people worldwide have HPV genital infections, the most common viral infection of the reproductive tract. The peak incidence of HPV infection occurs in adolescents and young adults under 25 years of age.<sup>1</sup>

HPVs are non-enveloped, double-stranded DNA viruses<sup>2</sup> in the papillomaviridae family with circular genome enclosed in a capsid shell comprising major (L1) and minor (L2) structural proteins which infect epithelial cells of the skin or mucosa. HPV genomes also encodes several 'early' genes (E1-E7) that direct viral transcription and replication and interact with the human genome.<sup>3</sup>

High-risk HPV types have the genes E6 and E7, which are associated with cell immortalization and transformation related to carcinogenesis. The HPV types are most strongly associated with invasive cervical cancer and other HPV-related cancers are 16 and 18. For invasive cervical cancers, the next most common types include 31, 33 and 45. The dominant oncogenic type in all regions is HPV16. Cervical cancer is the most common HPV-related malignancy worldwide and is the second most common type of cancer among women. Risk factors for transmission and acquisition of HPV infection include multiple sex partners, lack of condom use, smoking, and co-infection with other sexually transmitted infections

## INTRODUCTION

(STIs), including HIV, a male partner with multiple sex partners. Longitudinal and cross-sectional studies demonstrate that the most consistent predictor of HPV infection in women is the number of lifetime or recent sex partner.

Carcinoma of the uterine cervix is the second most common cancer in the districts of Dibrugarh, Kamrup Urban and third in Silchar Town with AAR of 11.8%, 13.1% and 13.9%. (ICMR, 2003-2004) Despite the high incidence of cervical cancer reported from Assam, a state in north east India, population based or hospital based studies on the HPV prevalence and genotypic distribution are very few from this region. A PCR based study detected 24.0% HPV prevalence among suspected cervical cancer patients attending Silchar Medical College at Silchar, southern Assam.<sup>4</sup> Incidences and mortality of cervical cancer is highest in countries where effective screening, diagnosis and treatment are absent or limited. It is thus expected that carrying out studies on HPV in this part of the country would throw some light on prevalence of HPV 16 and 18 among sexually active reproductive age group female with white discharge or cervical lesion. It will help in adopting measures for prevention as well as improve outcome in cases of cervical cancer.

## MATERIAL AND METHODS

A cross sectional, observational study was carried out in the gynaecology OPD, Department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital, Guwahati. A total of 110 women in reproductive age group who are sexually active with cervical lesion and vaginal discharge were studied. Patient particulars were noted, detail history including sexual behaviour of the patient and partner, history of STI, general and systemic examination were done and a total of 110 dry paper smear of cervical scraping were collected.

The research topic has already been approved by the Institutional Ethical Committee. The study was conducted from 1<sup>st</sup> June 2012 to 31<sup>st</sup> May 2013. Cervical scraping from the posterior vaginal pool was smeared onto Whatman 3 MM filter paper, and stored individually at room temperature in air-locked zip-lock bags after labelling for HPV DNA testing by PCR. The dry paper smears were carried to the Regional Medical Research Centre (RMRC) for North East India situated at Dibrugarh, for detection of HPV DNA by PCR. The HPV DNA PCR was carried out according to the method described by Usha Sharma et al.<sup>5</sup>

All data were analyzed by applying **Pearson's Chi-Square test** ( $\chi^2$ ) of significance. A 'p' value of more than 0.05 was considered to have no significant variation, p value less than 0.05 was considered significant and 'p' value less than 0.001 was considered to have highly significant variation.

## OBSERVATION AND RESULT

**1. Prevalence of HPV:** Prevalence of HPV in 110 cases is shown in **Table 1**.

**Table 1** Results of HPV infection

Total test done	HPV +ve (9.09%)	HPV -ve (90.91%)
110	10	100
	HPV 16=4(3.64%)	
	HPV18=0(0 %)	
	HPV other=6 (5.45%)	

**2. Age:** The association of HPV status with age of 110 cases are narrated in **Table 2**. It has been found that there is a significant association between the age factor and HPV status ( $p < 0.01$ ), i.e., younger the age group more prevalence of HPV.

**Table 2** Association of HPV status with age

Age (years)	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
<25 years	0	6	6	5	16.693* ( $p < 0.01$ )
25-29yrs	0	29	29		
30-34yrs	4	24	28		
35-39 yrs	3	25	28		
40-44 yrs	1	15	16		
45 yrs & above	2	1	3		
<b>Total</b>	<b>10</b>	<b>100</b>	<b>110</b>		

**3. No of pregnancy:** There is no significant association between number of pregnancy and HPV status ( $p > 0.05$ ) as shown in **Table 3**.

**Table 3** Association of HPV status with the no. of pregnancy

No.of pregnancy	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
0	0	3	3	4	2.355 $p > 0.05$
1	0	15	15		
2	3	30	33		
3	4	29	33		
4 & above	3	23	26		
<b>Total</b>	<b>10</b>	<b>100</b>	<b>110</b>		

**4. Socio-economic status, educational attainment and religion:** No significant association was found between socioeconomic status, educational attainment and religion with HPV infection.

**5. Age at first sexual exposure:** Significant association was found between the incidence of HPV and the age of first sexual exposure as shown in **Table 4**.

**Table 4** Distribution of cases according to their age at first sexual exposure

Age at first sexual exposure	HPV+ve	HPV-ve	Total	d.f.	$\chi^2$ -value
≤20	9	79	88	2	6.188* (p<0.05)
21-25	0	20	20		
26-30	1	1	2		
Total	10	100	110		

**6. Duration of marriage and history of contraception:** No significant association was found between the incidence of HPV and the duration of marriage (p>0.05) and history of contraception.

**7. History of vaginal discharge:** Significant association was found between presence of white discharge and HPV status as shown in **Table 5**.

**Table 5** Association of HPV status with the history of vaginal discharge

Vaginal discharge	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
Yes	7	91	98	1	4.125* (p<0.05)
No	3	9	12		
Total	10	100	110		

**8. History of vaginal bleeding:** A highly significant association has been found between vaginal bleeding and HPV status as shown in **Table 6**.

**Table 6** Association of HPV status with the history of vaginal bleeding

Vaginal bleeding	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
Yes	5	92	97	1	15.388** (p<0.01)
No	5	8	13		
Total	10	100	110		

**9. PAP smear Test:** A highly significant association has been found between the PAP smear test and HPV status (with p<0.01).

**Table 7** Association of HPV status with Pap smear test category

Pap smear	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
HSIL/ECA	9	7	16	1	50.385** (p<0.01)
NILM	1	93	94		
Total	10	100	110		

**10. History of STI:** A highly significant association has been found between the H/O STI and incidence of HPV (p<0.01).

**Table 8** Association of HPV status with the history of STI

History of any STIs	HPV +ve	HPV -ve	Total	d.f.	$\chi^2$ -value
yes	6	9	15	1	20.078** (p<0.01)
No	4	91	95		
Total	10	100	110		

**11. HPV and multiple sex partners:** No significant association has been found between the H/O multiple sex partner and prevalence of HPV (p>0.05).

**12. History of having male partner with multiple sex partners:** No significant association has been found between the H/O having male partner with multiple sex partner and prevalence of HPV (p>0.05).

## DISCUSSION

The present study showed a lower prevalence of HPV compared with the study done by Laikangbam P et al<sup>6</sup> in Sikkim and Kulkarni SS et al<sup>7</sup> in Karnataka, but similar results were found in the study done by Srivastava S et al<sup>8</sup> in Uttar Pradesh and in Eastern India by Dutta et al<sup>9</sup>. In Manipur, a neighbouring state in Assam, lower prevalence of HPV has been observed. Present study has almost similar findings with that of lower Assam by Usha Sarma et al.<sup>5</sup>

The age group of the present study is similar to the study of Kataja et al 1993<sup>10</sup>, Gradiolone et al<sup>11</sup> and Monk J Bradley et al.<sup>12</sup>

There was no significant association between HPV status

and number of pregnancy. Dutta et al<sup>9</sup> found significant association between HPV infection and women with parity  $\geq 4$ . No significant association found between socioeconomic status with HPV infection. Similar findings were reported by Cherian Varghese<sup>13</sup> and Lar Munoz et al.<sup>14</sup> No significant association found between religions with HPV infection. Similar findings were reported by Cherian Varghese<sup>13</sup> and Laikangbam et al.<sup>6</sup>

In the present study significant association was found between the incidence of HPV and the age of first sexual exposure and these finding was supported by Kenny et al<sup>14</sup> and Jessica A. Kahn et al.<sup>15</sup> The findings of vaginal discharge was supported by the findings of Paul K S Chan.<sup>16</sup> A highly significant association has been found between the PAP smear test and HPV status which was supported by the findings of Cherian Varghese<sup>13</sup> and Frega A et al.<sup>17</sup> A highly significant association has been found between the history of sexually transmitted infection and incidence of HPV which has been supported by **Petroula Stamataki** et al<sup>18</sup> and Brinton et al.<sup>19</sup>

No significant association has been found between the history of multiple sex partners and prevalence of HPV ( $p > 0.05$ ). Munoz et al.<sup>14</sup> reported 4 fold increase of HPV infection in women who had 6 or more partner. In conservative societies like ours promiscuity is always underreported; this may be the reason why no significant association has been found for this factor in the present study.

No significant association has been found between the history of having male partner with multiple sex partner and prevalence of HPV ( $p > 0.05$ ). However Kenny<sup>20</sup> reported increase in risk of HPV infection in women with male partners having multiple sexual partners.

## CONCLUSION

High-risk HPV types 16 and 18 are responsible for the great majority of HPV-related malignant diseases and screening of women for this etiological agent could be a potentially applicable measure in early detection of the disease. Mortality rates are highest in low-income countries, where most disease is detected at late stage because there is little or no access to screening and effective treatment. The present study shows a prevalence of 9.09% of HPV infection among sexually active reproductive age group female with white discharge or cervical lesion. The present study also shows significant association of HPV infection with younger age, early

initiation of sexual activity, associated symptoms like white discharge or irregular vaginal bleeding, H/O other sexually transmitted infections and abnormal pap smear report. Such information is important for evaluating importance of the early screening and use of anti-HPV vaccines as a public measure in controlling the burden of cervical cancer.

**Conflict of interest:** None declared.

**Ethical clearance:** Done.

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ORIGINAL PAPER

## A New Approach to Dactyloscopy

**Deka Rup Sekhar<sup>1</sup>, Medhi Shobhana<sup>2</sup>**

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### ABSTRACT

*Dactyloscopy, i.e. the study of fingerprints is a very important tool in establishing the identity of an individual, whether living or dead. The present study was undertaken in the Department of Anatomy, Gauhati Medical College, Guwahati, Assam, amongst a group of 145 1<sup>st</sup> MBBS students comprising of 89 males and 56 females between the age group of 18 to 23 years, having different ethnic backgrounds, after approval of the Institutional Ethical Committee, with an aim to find out if there was any variation between persons showing 'same fingerprint pattern in all five fingers', 'same fingerprint pattern in four fingers', 'same fingerprint pattern in three fingers', and 'same fingerprint pattern in two fingers' and also to see whether there is any difference between male and female pattern of fingerprint distribution. The fingerprint patterns were classified on the basis of Michael Kucken's classification system as Loop, Arch, Whorl and Composite pattern. The data recorded was analysed statistically using Student's T-test. P value < 0.05 is considered as statistically significant. Such a study may be useful in establishing a database which may be useful in forensic science.*

**Keywords:** Identification, Dactyloscopy, Fingerprint

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### INTRODUCTION

Dactyloscopy is a very important tool that aid forensic experts in establishing the identity of an individual, whether living or dead.<sup>1</sup> It is the system of examination of fingerprints (from the Greek word 'dactylos' which means finger and 'skopein' which means to watch). Finger prints are the reproductions of the patterns formed by the papillary ridges present on the palmar aspects of the thumbs and fingers. They afford an infallible means of personal identification, because the ridge arrangement on every finger of every human being is unique and does not alter with growth or age. Fingerprint ridge density is a potential tool for identification, even from partial prints.<sup>2,3</sup> The study of finger prints is also known as Dermatoglyphics.<sup>4,5,6</sup> Englishmen Henry Faulds and William James Herschel first described the uniqueness and permanence of finger prints. Sir Francis Galton suggested the first elementary system for classifying fingerprints. Galton's system served as the basis for the fingerprint classification systems developed by Sir Edward R. Henry. The Galton-Henry system of fingerprint classification, published in June 1900, was officially introduced at Scotland Yard in 1901 and quickly became the basis for its criminal-identification records.<sup>7</sup>

### OBJECTIVES

- (i) To find out if there was any difference between persons showing 'same fingerprint pattern in all five fingers', 'same fingerprint pattern in four fingers', 'same fingerprint pattern in three fingers', and 'same fingerprint pattern in two fingers'.
- (ii) To see whether there is any difference between male and female in the above mentioned categories.

## MATERIALS AND METHODS

**Materials:** (i) Printer's blue ink, (ii) White bond paper (Royal Executive Bond, Premium White A4 sheets), (iii) Magnifying glass (10X), (iv) Pen for labelling individual details.

**Method:** The present study has been conducted in the Department of Anatomy, Gauhati Medical College, Guwahati, Assam, amongst a group of 145 1<sup>st</sup> MBBS students comprising of 89 males and 56 females between the age group of 18 to 23 years, having different ethnic backgrounds, after approval of the Institutional Ethical Committee. All the participants were briefed about the purpose of the study and written informed consent was also taken from them. Care was taken to select individuals having no lesions, whether active or passive on the fingers.

**Collection of Prints:** For obtaining the finger prints, the dominant hand of the subjects was taken. The impressions of all five fingers were taken using printer's blue ink on the A4 sheets.

**Analysis of Prints:** The prints that were recorded were studied with a magnifying lens. The fingerprint patterns were classified on the basis of Michael Kucken's classification system as Loop, Arch, Whorl and Composite pattern. The data recorded was analysed statistically using Student's T-test. *P* value  $< 0.05$  is considered as statistically significant.

## OBSERVATION & RESULTS

The results and observations of the present study is tabulated and graphed as follows:

**Table 1** Cases where five fingers show same fingerprint pattern

Pattern of fingerprint	Male	Female
Loop	18	10
Arch	1	1
Whorl	3	4
Composite	0	0
SUM	22	15
Mean	5.5	3.75
SD	$\pm 8.426$	$\pm 4.500$
SEM	$\pm 4.213$	$\pm 2.250$

In the present study it is seen that in the category of 'five fingers showing same fingerprint' the number of male cases according to different pattern of finger print ranges

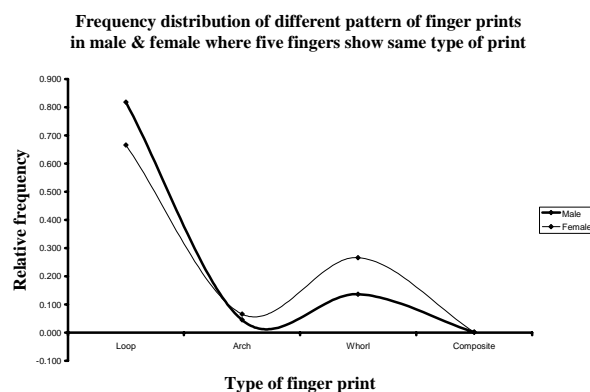
from 18 to nil with a mean value of 5.5, Standard Deviation  $\pm 8.426$  and Standard Error of Mean  $\pm 4.213$  and the number of female cases according to different pattern of finger print ranges from 10 to nil with a mean value of 3.75, Standard Deviation  $\pm 4.500$  and Standard Error of Mean  $\pm 2.250$  as evident from **Table 1**.

**Table 2** Frequency, relative frequency & percentage

Class interval of different type of finger print	Four fingers showing same print in male & female					
	Male			Female		
	f (frequency)	fr (relative frequency)	f% (percentage)	f (frequency)	fr (relative frequency)	f% (percentage)
Loop	18	0.818	81.800	10	0.666	66.600
Arch	1	0.045	4.500	1	0.066	6.600
Whorl	3	0.136	13.600	4	0.266	26.600
Composite	0	0.001	0.100	0	0.002	0.200
<b>Sum</b>	<b>22</b>	<b>1.000</b>	<b>100.000</b>	<b>15</b>	<b>1.000</b>	<b>100.000</b>

**Table 2** shows that for the male group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.818, simple frequency of 18 and a percentage of 81.800. The lowest number of subjects are found in the class interval of 'Composite' type of fingerprint with a relative frequency of 0.001, simple frequency of 0 and a percentage of 0.100 as evident in **Figure 1**.

For the female group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.666, simple frequency of 10 and a percentage of 66.600. The lowest number of subjects are found in the class interval of 'Composite' type of fingerprint with a relative frequency of 0.002, simple frequency of 0 and a percentage of 0.200 as evident in **Figure 1**.



**Figure 1** Relative frequency distribution

**Table 3** Cases where four fingers show same fingerprint pattern

Pattern of fingerprint	Male	Female
Loop	16	21
Arch	2	3
Whorl	8	3
Composite	0	0
<b>SUM</b>	<b>26</b>	<b>27</b>
<b>Mean</b>	<b>6.5</b>	<b>6.75</b>
<b>SD</b>	<b>±7.188</b>	<b>±9.605</b>
<b>SEM</b>	<b>±3.594</b>	<b>±4.802</b>

In the category of ‘four fingers showing same fingerprint’ the number of male cases according to different pattern of finger print ranges from 16 to nil with a mean value of 6.5, Standard Deviation  $\pm 7.188$  and Standard Error of Mean  $\pm 3.594$  and the number of female cases according to different pattern of finger print ranges from 21 to nil with a mean value of 6.75, Standard Deviation  $\pm 9.605$  and Standard Error of Mean  $\pm 4.802$  as evident from **Table 3**.

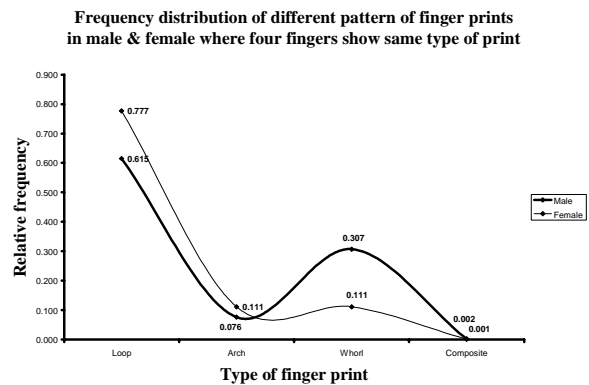
**Table 4** Frequency, relative frequency & percentage

Class interval of different type of finger print	Four fingers showing same print in male & female					
	Male			Female		
	f (frequency)	fr (relative frequency)	f% (percentage)	f (frequency)	fr (relative frequency)	f% (percentage)
Loop	16	0.615	61.500	21	0.777	77.700
Arch	2	0.076	7.600	3	0.111	11.100
Whorl	8	0.307	30.700	3	0.111	11.100
Composite	0	0.002	0.200	0	0.001	0.100
<b>Sum</b>	<b>26</b>	<b>1.000</b>	<b>100.000</b>	<b>27</b>	<b>1.000</b>	<b>100.000</b>

**Table 4** Shows that for the male group highest number of subjects are found in the class interval of ‘Loop’ type of fingerprint with a relative frequency of 0.615, simple frequency of 16 and a percentage of 61.500. The lowest number of subjects are found in the class interval of ‘Composite’ type of fingerprint with a relative frequency of 0.002, simple frequency of 0 and a percentage of 0.200 as evident in **Figure 2**.

For the female group highest number of subjects are found in the class interval of ‘Loop’ type of fingerprint with a relative frequency of 0.777, simple frequency of 21 and a percentage of 77.700. The lowest number of subjects are found in the class interval of ‘Composite’ type of fingerprint with a relative frequency of 0.001, simple frequency of 0 and a

percentage of 0.100 as evident in **Figure 2**.

**Figure 2** Relative frequency distribution**Table 5** Cases where three fingers show same fingerprint pattern

Pattern of fingerprint	Male	Female
Loop	22	8
Arch	3	0
Whorl	10	4
Composite	0	0
<b>SUM</b>	<b>35</b>	<b>12</b>
<b>Mean</b>	<b>8.75</b>	<b>3</b>
<b>SD</b>	<b>±9.777</b>	<b>±3.830</b>
<b>SEM</b>	<b>±4.888</b>	<b>±1.915</b>

In the category of ‘three fingers showing same fingerprint’ number of male cases according to different pattern of finger print ranges from 22 to nil with a mean value of 8.75, Standard Deviation  $\pm 9.777$  and Standard Error of Mean  $\pm 4.888$  and the number of female cases according to different pattern of finger print ranges from 8 to nil with a mean value of 3, Standard Deviation  $\pm 3.830$  and Standard Error of Mean  $\pm 1.915$  as evident from **Table 5**.

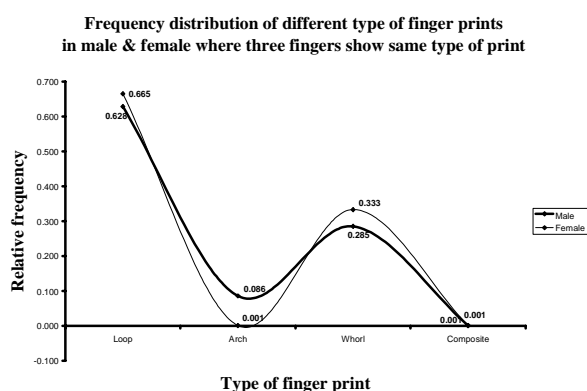
**Table 6** Frequency, relative frequency and percentage

Class interval of different type of finger print	Three fingers showing same print in male & female					
	Male			Female		
	f (frequency)	fr (relative frequency)	f% (percentage)	f (frequency)	fr (relative frequency)	f% (percentage)
Loop	22	0.628	62.800	8	0.665	66.500
Arch	3	0.086	8.600	0	0.001	0.100
Whorl	10	0.285	28.500	4	0.333	33.300
Composite	0	0.001	0.100	0	0.001	0.100
<b>Sum</b>	<b>35</b>	<b>1.000</b>	<b>100.000</b>	<b>12</b>	<b>1.000</b>	<b>100.000</b>



**Table 6.** shows that for the male group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.628, simple frequency of 22 and a percentage of 62.800. The lowest number of subjects are found in the class interval of 'Composite' type of fingerprint with a relative frequency of 0.001, simple frequency of 0 and a percentage of 0.100 as evident in **Figure 3**.

For the female group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.665, simple frequency of 8 and a percentage of 66.500. The lowest number of subjects are found in the class interval of 'Composite' type of fingerprint with a relative frequency of 0.001, simple frequency of 0 and a percentage of 0.100 as evident in **Figure 3**.



**Figure 3** Relative frequency distribution

**Table 7** Cases where two fingers show same fingerprint pattern

Pattern of fingerprint	Male	Female
Loop	13	5
Arch	5	0
Whorl	10	4
Composite	1	0
<b>SUM</b>	<b>29</b>	<b>9</b>
<b>Mean</b>	<b>7.25</b>	<b>2.25</b>
<b>SD</b>	<b>±5.315</b>	<b>±2.630</b>
<b>SEM</b>	<b>±2.657</b>	<b>±1.315</b>

In the category of 'two fingers showing same fingerprint' number of male cases according to different pattern of finger print ranges from 13 to 1 with a mean value of 7.25, Standard Deviation  $\pm 5.315$  and Standard Error of Mean  $\pm 2.657$  and the number of female cases according to

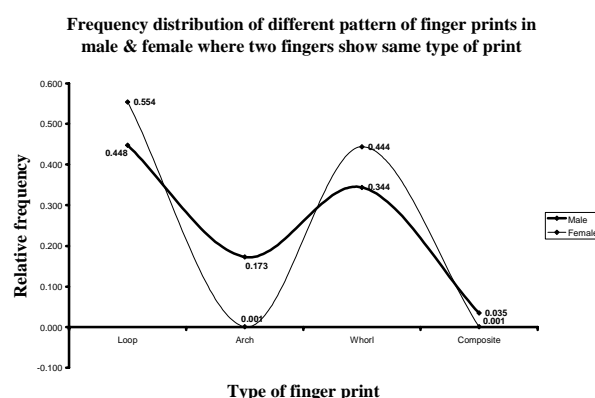
different pattern of finger print ranges from 5 to nil with a mean value of 2.25, Standard Deviation  $\pm 2.630$  and Standard Error of Mean  $\pm 1.315$  as evident from **Table 7**.

**Table 8** Frequency, relative frequency and percentage

Class interval of different type of finger print	Two fingers showing same print in male & female					
	Male			Female		
	f (frequ- ency)	fr (relative frequ- ency)	f% (percen- tage)	f (frequ- ency)	fr (relative frequ- ency)	f% (per- centage)
Loop	13	0.448	44.800	5	0.554	55.400
Arch	5	0.173	17.300	0	0.001	0.100
Whorl	10	0.344	34.400	4	0.444	44.400
Composite	1	0.035	3.500	0	0.001	0.100
<b>Sum</b>	<b>29</b>	<b>1.000</b>	<b>100.000</b>	<b>9</b>	<b>1.000</b>	<b>100.000</b>

**Table 8** Shows that for the male group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.448, simple frequency of 13 and a percentage of 44.800. The lowest number of subjects are found in the class interval of 'Composite' type of fingerprint with a relative frequency of 0.035, simple frequency of 1 and a percentage of 3.500 as evident in **Figure 4**.

For the female group highest number of subjects are found in the class interval of 'Loop' type of fingerprint with a relative frequency of 0.554, simple frequency of 5 and a percentage of 55.400. The lowest number of subjects are found in the class interval of 'Arch' & 'Composite' type of fingerprint with a relative frequency of 0.001, simple frequency of 0 and a percentage of 0.100 as evident in **Figure 4**.



**Figure 4** Relative frequency distribution

**Table 9** Level of significance of differences between the various categories

Comparison of mean between	“t”	P
Male and female subjects where five fingers show same print	0.274	P <0.05
Male and female subjects where four fingers show same print	0.021	P >0.05
Male and female subjects where three fingers show same print	1.095	P >0.05
Male and female subjects where two fingers show same print	1.686	P >0.05
Male subjects of ‘five fingers showing same print’ & ‘four fingers showing same print’	0.180	P >0.05
Male subjects of ‘four fingers showing same print’ & ‘three fingers showing same print’	0.370	P >0.05
Male subjects of ‘three fingers showing same print’ & ‘two fingers showing same print’	0.269	P >0.05

**Figure 5** (A) & (B) Photograph of ‘three fingers showing same print’

## DISCUSSION

Establishing the identity of an individual is necessary for many reasons such as personal, social, and legal, including certification of death.<sup>8</sup> It becomes necessary to establish the identity of an individual in cases of discovering an unknown deceased person in situations concerning homicide, suicide, accident, mass disaster etc. It is also necessary for locating living missing individuals or culprits concealing their identity.<sup>9</sup> It is one of the most challenging subjects to be dealt with in forensic science. The concept of identity is a set of physical characteristics, functional or psychic, normal or pathological, that defines an individual.<sup>10</sup> The use of fingerprints in establishing the identity of an individual has been known since the finding of finger impressions on the clay surface of Babylonian legal contracts almost 4,000 years ago.<sup>11</sup> Fingerprints are constant and individualistic and form the most reliable criteria for identification.<sup>12, 13</sup> These patterns are genotypically determined and remain

unchanged from birth till death.<sup>14</sup> Fingerprints collected at a crime scene can be used to identify suspects, victims and other persons who touched the surface. Fingerprint scans can be used to validate electronic registration, cashless catering and library access especially in schools and colleges.<sup>15</sup>

A lot of research has been conducted till date on fingerprinting. Most of the studies have concluded that loop pattern of finger print is the most common followed by whorl pattern, arch pattern and composite pattern.<sup>15, 16</sup> Our study is consistent with this universal observation. However, the distribution of fingerprint patterns in all the five fingers has not been considered for statistical analysis till date. Our study seems to be the first of its kind and hopes to provide a reliable help while considering distribution of fingerprints in forensic science.

## CONCLUSION

The present study revealed that the number of male cases is significantly higher ( $p < 0.05$ ) than the female cases where five fingers show same print pattern. On the other hand, though the number of male cases is higher than the number of female cases in all the three categories i.e. ‘four fingers showing same print’, ‘three fingers showing same print’ and ‘two fingers showing same print’, this is of no statistical significance ( $p > 0.05$ ). The number of male cases is higher in the group of “Five fingers showing same print” than the group of “Four fingers showing same print” but without any statistical significance ( $p > 0.05$ ). The number of male cases in the group of “Four fingers showing same print” is less than the group of “Three fingers showing same print” but without any statistical significance ( $p > 0.05$ ). The number of male cases in the group of “Three fingers showing same print” is more than the group of “Two fingers showing same print” which is also without any statistical significance ( $p > 0.05$ ).

Hence, from the above study, we can conclude that the highest to lowest trend of finger print pattern are seen respectively as ‘Five fingers showing same print’, ‘Three fingers showing same print’, ‘Two fingers showing same print’ and ‘Four fingers showing same print’ which is without much significance. Further, in most of the varieties of finger print pattern there are no significant differences between male and female, but male cases are significantly higher than the female cases in the pattern of ‘five fingers showing same print’ ( $p < 0.05$ ).

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**Contribution of Authors:** We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

**Ethical clearance:** Taken from Institutional Ethical Committee.

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CASE ARTICLE

## Unconventional Presentation of Multiple Myeloma: A Series of Three Cases

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### ABSTRACT

*Multiple myeloma is a clonal plasma cell malignancy, characterized by the proliferation of neoplastic plasma cells. Usually abnormality of most plasma cell originates as bone marrow tumor, but they occasionally present in extra medullary sites. Here, we report a series of three cases of multiple myeloma presenting with extra medullary dissemination in pulmonary parenchyma, acute renal failure at young age and non-specific back pain with a view to demonstrate the variability in the presentation of multiple myeloma which can easily be missed and give us insight for considering the possibility of multiple myeloma with such uncommon findings.*

**Keywords:** Multiple myeloma, plasma cell, bone marrow, haemoglobin

### INTRODUCTION

In multiple myeloma the circulating monoclonal immunoglobulins and/or their subunits are leading cause of Proteinuria, renal tubular damage and amyloid deposits. Stimulation of osteoclasts results in hypocalcaemia and bone loss.<sup>1</sup> About 1-5% cases may not demonstrate immunoglobulins or their subunits in serum or urine (non-secretory multiple myeloma).<sup>3</sup> The occurrence of extramedullary disease is uncommon in multiple myeloma. The sites of extramedullary dissemination reported in the literature are spleen, liver, kidney, thyroid, adrenal, ovary, lung, pleura, and pericardium.<sup>4</sup>

**Case report-1:** A 55-year-old male came with a vague complaint of progressive mild chest pain, cough, mild breathlessness, palpitation on exertion and intermittent low grade fever for last two months duration and severe itching for last two days. The patient was a non-smoker, non-alcoholic with no history of fever or preceding trauma. Physical examination revealed no significant abnormality except mild pallor. There was no sign of pulmonary hypertension, organomegaly, cardiac or renal failure. The liver function was within normal limit. Laboratory investigation revealed haemoglobin – 8 g/dl, ESR-90 mm (AEFH), peripheral smear showed marked rouleaux formation, random blood sugar – 80 mg/dl, LDH-940 U/L, serum creatinine – 0.9 mg/dl, pleural fluid for ADA 12.6 U/L, Serum protein electrophoresis showed no M –band,  $\alpha_2$ -microglobulin-3.40 mg/L (normal – 0.81 – 2.19 mg/L), bronchial lavage fluid did not show malignant cells, no acid fast bacillus and fungal elements seen on bronchial aspirate, prostate specific antigen - 0.92 ng/ml. Chest radiographs suggested left sided pleural effusion with mediastinum shifting towards right side causing

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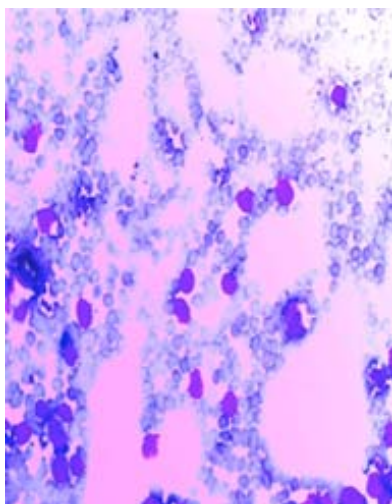
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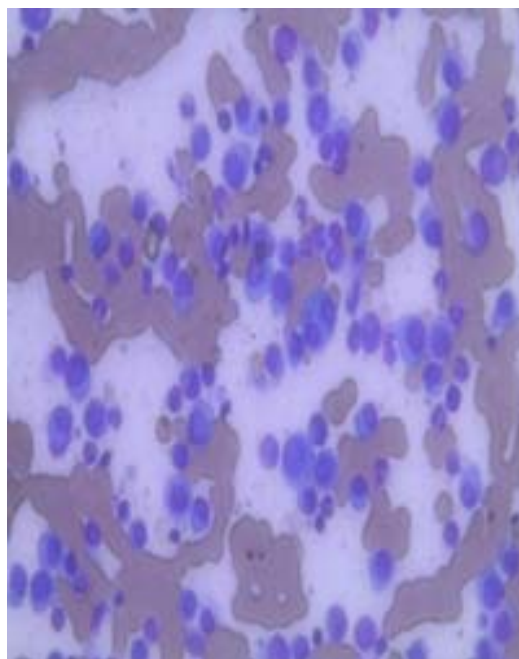
obliteration of the cardiac shadow (**Figure 1**) X-ray of skull showed multiple punched out radiolucent lytic areas. Percutaneous fine needle aspiration cytology and biopsy from pleura was done which showed cellular infiltrate comprising mature and immature plasma cells, including binucleate and multinucleate forms along with pulmonary parenchymal cells (**Figure 2**). Bone marrow aspiration examination showed 70% plasma cell constituting both mature and immature type (**Figure 3**). There was no Bence Jones protein in urine. **Diagnosis of plasmacytoma was suggested and further work up of patient was advised to rule out pulmonary dissemination of multiple myeloma.** Based on these findings, a final diagnosis of multiple myeloma of plasmablastic type was made.



**Figure 1** Chest radiographs suggested left sided pleural effusion with mediastinal midline shift

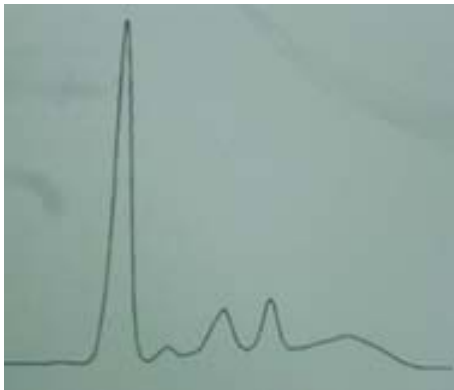


**Figure 2** Histology of pleural aspirate shows plasma cells in necrotic proteinaceous and haemorrhagic background (40X)

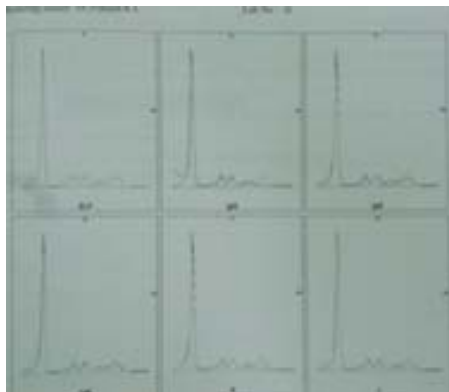


**Figure 3** Bone marrow aspiration examination showed 70% plasma cell constituting both mature and immature type (H and E : 20X)

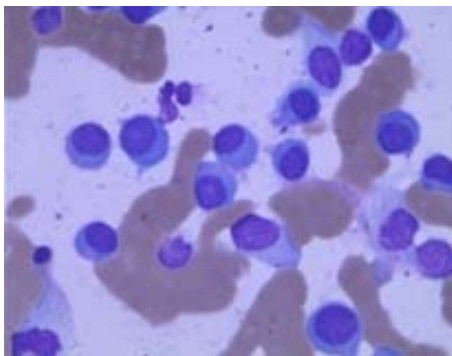
**Case report-2:** A 38-year-old male experienced abdominal cramps associated with nausea, vomiting, and decreased appetite. Physical examination revealed only mild discomfort on deep palpation of abdomen. Investigation revealed haemoglobin (4.4 g/dl), ESR – 90 AEFH, . Serum urea - 131 mg/dl (19.26 – 42.8 mg/dl), serum creatinine 8.4 mg/dl (0.66 – 1.25 mg/dl) with normal serum calcium and total protein. X-ray skull, pelvis, spine and long bones was normal. Urine analysis showed mild proteinuria, hematuria and granular casts. Serum protein electrophoresis did not show M spike (**Figure-1**). Serum protein immunotyping showed polyclonal gammopathy (**Figure 4**). There was no Bence Jones protein in urine. Bone marrow cytology revealed 70% plasma cells (**Figure 5**). Bone marrow trephine biopsy showed hypercellular marrow particles with atypical plasma cell infiltration consistent with plasma cell. Serum free light chain assay revealed kappa 33 mg/dl (3.3 0 – 19.40 mg/L) and lamda 29 mg/L (5.70 – 26.30 mg/L). Urine protein electrophoresis revealed total protein 0.67 g/24 hours and total volume 1000 ml/24 hours. Cytogenetic profile revealed normal Karyotype 46, XY. Based on these findings patient was diagnosed as multiple myeloma with acute renal failure. He was treated with Bortezomib-Dexamethasone and also underwent dialysis.



**Figure 4** Serum Protein Electrophoresis shows no M band in gamma region



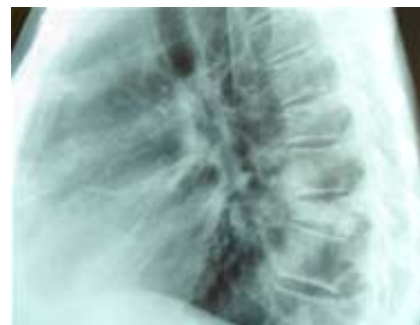
**Figure 5** Serum Protein Immunotyping shows polyclonal gammopathy



**Figure 6** Histopathology of bone marrow aspiration shows large amount of plasma cell (40X)

**Case Report-3:** A 53-year-old female experienced pain in the back bone and right knee joint for three years duration without any such past history. Examination revealed tenderness on the right side of the thoracolumbar spine along with paravertebral muscle spasm, normal hip joint and neurological deficit. Laboratory evaluation revealed

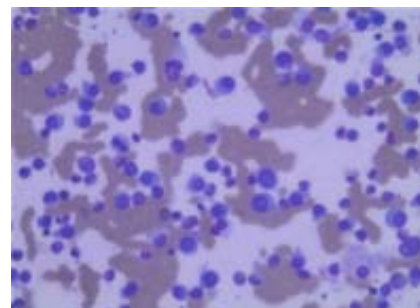
mild low haemoglobin and normal biochemical parameters. Radio imaging revealed collapse and compression fracture of T9 vertebrae (**Figure 7**). Bone scan showed abnormal increase uptake in thoracolumbar vertebrae, multiple bilateral ribs and right iliac bone. Serum protein electrophoresis was normal (**Figure 8**). There was no Bence Jones protein in urine. Bone marrow aspiration revealed a hypercellular marrow with near total replacement by mature and immature plasma cells (80%) (**Figure 9**). Diagnosis of non-secretory multiple myeloma was made. Patient received radiation to relieve her back pain followed by chemotherapy.



**Figure 7** X-ray of dorsolumbar spine shows collapse vertebrae at D9



**Figure 8** Normal Serum protein electrophoresis



**Figure 9** Histology of bone marrow aspiration shows large amount of mature and immature plasma cells (H and E : 10X)

## DISCUSSION

Multiple myeloma is a clonal proliferation of plasma cells that occurs in older adults, median age at diagnosis is about 70 years.<sup>5,6</sup> Presenting symptoms include fatigue, generalized weakness, weight loss, bone pain, and there is often evidence of some organ damage.<sup>7</sup> The diagnosis of multiple myeloma depends on a concurrence of features, and several different diagnostic criteria as suggested by the International Myeloma working group.<sup>8</sup> They also have an increased risk of vertebral compression fractures.<sup>9</sup> One of our patients experienced nonspecific pain in his chest, back and knee joint with no improvement with symptomatic treatment. Typically, pain of pathological origin should be suspected in patients whose age is over 50, a previous history of cancer, no relief with rest, resistant to treatment and constitutional symptoms such as unexpected weight loss, fever, and fatigue.<sup>10</sup> Differential diagnosis includes metastatic tumors, lymphomas, primary bone lesions and other lesions of hematopoietic origin such as langerhan's cell histiocytosis.<sup>11</sup> Radiographic evaluation should always be persuaded in patients with pain. Our first case was diagnosed as multiple myeloma with plasmablastic malignant effusion. Malignant pleural effusion is usually a rare and late complication in the course of the disease.<sup>9</sup> Hence other aetiologies of reactive pleural effusions like pneumonia, tuberculosis, congestive heart failure, collagen vascular disease, viral illness, carcinomatosis, AIDS and pulmonary thromboembolism should be excluded before a diagnosis of malignant myelomatous effusion is made.<sup>12</sup> On cytological examination, the picture can have a predominant lymphocytic infiltration with scattered plasma cells showing atypical nuclear features. Other common conditions of the non-myelomatous effusions that present with pleural effusion includes Non-Hodgkin Lymphoma, acute and chronic lymphoid leukaemia, especially those with concomitant mediastinal involvement.<sup>13</sup> The three processes like Pleural fluid electrophoresis, flow cytometry and immunocytochemistry aid in confirming the monoclonality of the plasma cells.<sup>12</sup> Usually 15% to 30% of patients of multiple myeloma present with acute renal failure at the time of diagnosis and approximately 20% of the patient develops progressive renal failure during the course of the disease.<sup>14</sup> Renal function returns to normal after treatment in about 50% of patients.<sup>15</sup> In our case 2 young males suffering from acute renal failure with no evidence of anemia or hypercalcaemia despite numerous destructive bone lesion, made it a rare presentation of multiple myeloma. Multiple myeloma should always be

considered in differential diagnosis of unexplained ARF in middle aged and elderly persons.<sup>16</sup> Rarely in advanced multiple myeloma, metastatic deposits outside the bone marrow (extramedullary) are seen.

Multiple myeloma patients also have an increased risk of vertebral compression fractures.<sup>9</sup> In case number -3, the patient experienced nonspecific pain in his chest, back and knee joint with no improvement with symptomatic treatment. Typically, pain of pathological origin should be suspected in patients whose age is over 50, a previous history of cancer exists, no relief with rest, resistant to treatment and constitutional symptoms such as unexpected weight loss, fever, and fatigue.<sup>17</sup> Differential diagnosis includes metastatic tumours, lymphomas, primary bone lesions and other lesions of hematopoietic origin such as Langerhan's cell histiocytosis.<sup>18</sup> Radiographic evaluation should always be persuaded in patients with pain. In nonsecretory multiple myeloma (NSMM), the plasma cells presumably fail to secrete an immunoglobulin. The first case of this variant was described in 1958, and the reported incidence has ranged from 1% to 5% of all cases of MM.<sup>19</sup> We present a case of delayed diagnosis of NSMM because of its illusive nature. Nonsecretory multiple myeloma is a variant of the classic form of MM and has a similar clinical presentation except for the absence of monoclonal gammopathy. Two types of NSMM have been described. In the first type, the plasma cells produce immunoglobulin but are not able to secrete it out of the cell. This form of NSMM the "producer" type (also called true nonsecretory or nonexcretory myeloma). In the "nonproducer" type, the plasma cells are unable to produce immunoglobulin. Although it is difficult to determine the exact frequency of the two types, more cases of the producer type have been reported.<sup>20-22</sup> At initial presentation, patients with NSMM usually have more advanced disease than those with classic myeloma. Although survival ranges from 6 months to 12 years, it may certainly be affected by a delay in diagnosis. Most published reports suggest that there is no significant difference in survival between NSMM and MM.<sup>22-25</sup>

## CONCLUSION

The signs and symptoms of multiple myeloma are nonspecific. Patients can present in a variety of clinical settings, which may delay the diagnosis and result in additional disease related complications. We want to bring the clinicians attention to some uncommon presentations

of multiple myeloma which are missed because of few unconventional findings. In addition to a tissue biopsy, bone marrow aspiration, serum protein electrophoresis, ESR and Bence–Jones proteins in urine must be carried out to confirm the diagnosis

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## Academic Excellence of Founder Member of IJHRMLP



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CASE ARTICLE

## Unusual Case of Vesicocutaneous Fistula-our Experience

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### ABSTRACT

*A rare case of vesicocutaneous fistula due to spontaneous expulsion of large vesical calculi is described. A 55-year-old woman suffered from continuous urinary leakage from a lower abdominal ulcer for the last 20 years after a history of spontaneous expulsion of stones from the lower abdomen. CT-IVU done revealed breach in linea alba below umbilicus for a length of 9 x 6.3 cm. Anterior bladder wall was absent at the fundus with contrast extravasation through the fistulous tract. We performed bladder closure with augmentation cystoplasty with terminal ileum along with meshplasty of the abdominal wall. Worldwide, vesical stone expulsion through a large vesicocutaneous fistula is extremely rare and no case has been reported till date.*

**Keywords:** Vesical calculus, infection, augmentation cystoplasty, meshplasty

### INTRODUCTION

Bladder stones are the most common manifestation of lower urinary tract lithiasis, accounting for 5% of all urinary stone disease and approximately 1.5% of all urologic hospital admissions.<sup>1</sup> Men are affected eight times more frequently than women.<sup>2</sup> Primary bladder stones develop in the absence of any known functional, anatomic or infectious factors and do not necessarily imply that stones have formed de novo in the bladder.<sup>3</sup> Peak incidence is at 2 to 4 years of age.<sup>4,5</sup> Stones are usually solitary and once removed, rarely recur. Secondary bladder calculi typically found in men older than the age of 60 and usually in concert with lower urinary tract obstruction, intravesical foreign body, neurogenic bladder and spinal cord injury.<sup>6,7</sup> Giant vesical calculi of more than 100g are rare in recent urological practice. Very few reports are available in literature having weight of vesical stone more than 100g.<sup>8</sup> Vesical stone expulsion through a large vesicocutaneous fistula is extremely rare and no case has been reported till date.

### CASE HISTORY

A 55 year old female came with a history of urinary leakage from a lower abdominal ulcer for the last 20 years. This was preceded with lower abdominal pain, fever with chill and rigor which progressed to thinning and reddening of lower abdominal skin, sudden burst out of lower abdomen with expulsion of 5-6 large calculi of the size of a potato, following which she was relieved of her symptoms but left behind an ulcer over the lower abdomen through which urine leaked continuously.

Per abdominal examination revealed a midline ulcer of 5 x 8 cm in the infra umbilical region. It was pale red in colour and thick, but does not bleed on touch (**Figure 1**).

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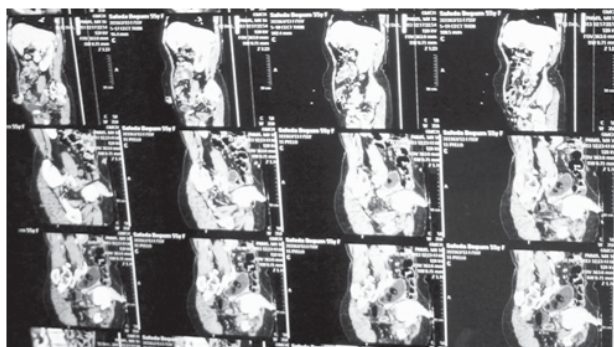
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The opening of the ulcer was deep into the pelvis and urine comes out continuously from the opening. The ulcer becomes larger and more prominent when the patient stood up. On catheterization the urethral catheter comes out through the defect in the lower abdomen.



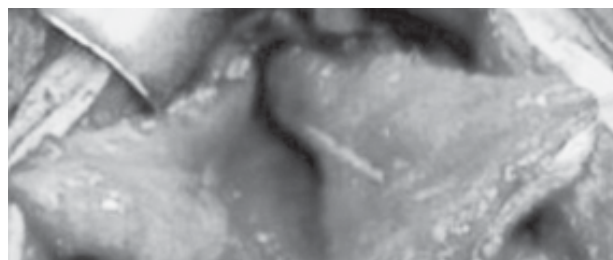
**Figure 1** Large Vesicocutaneous Fistula

CT-IVU done revealed divarification of recti along with breach in linea alba below umbilicus for a length of 9 x 6.3 cm. Anterior bladder wall is absent at the fundus. There is contrast extravasation through the fistulous tract (**Figure 2**).

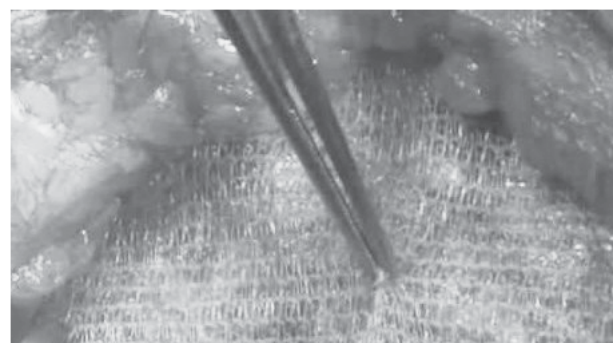


**Figure 2** CECT whole abdomen showing anterior abdominal wall defect and contrast extravasation seen through the defect

Urine culture was sterile and preoperative bladder biopsy showed increase collagen in the bladder wall. Bladder closure with augmentation cystoplasty with terminal ileum (**Figure 3**) along with meshplasty of the abdominal wall was done (**Figure 4**).



**Figure 3** Intraoperative picture showing thick bladder wall



**Figure 4** Abdominal wall meshplasty

## DISCUSSION

Bladder stones are the most common manifestation of lower urinary tract lithiasis, accounting for 5% of all urinary stone disease.<sup>1</sup> Bladder calculi in nonendemic areas are typically found in adults and almost always in association with other disease processes resulting in urinary stasis or the introduction of a foreign body. However, in endemic regions, bladder calculi often arise in children in whom a major anatomic abnormality does not coexist; in these regions, dietary intake and socioeconomic factors primarily influence the formation of bladder calculi. Vesicocutaneous fistula, a very distressing condition has a tremendous impact on the quality of life of the patient.<sup>9</sup> The constant leakage of urine results in maceration and eventual destruction of skin with ensuing infection, discomfort and malodour. With proper investigations and adequate surgical treatment it can be corrected and life threatening complication like malignancy and sepsis can be prevented.<sup>10</sup> A fistula is an abnormal communication between two epithelially lined surfaces.<sup>11</sup> Vesicocutaneous fistula is an external fistula; it may be congenital or acquired type. Acquired fistula occurs after operations on the urinary bladder, after accidental injury to bladder and in malignancy.<sup>12</sup> Internal fistula formation is most commonly due to malignant and inflammatory condition of surrounding viscera.<sup>13</sup> Patients with vesical calculi

usually presented with vague abdominal discomfort, dysuria, frequency, hematuria and urinary retention. Vesicocutaneous fistula formation due to vesical calculus is extremely a rare occurrence.<sup>14</sup> The rectus abdominal muscles make it difficult for a fistula to form in that area. Small bladder stone cause bladder irritation, so patients take immediate medical advice. Long standing vesical calculi may grow to a certain size without causing many symptoms. Again patients' reluctance or lack of awareness for medical advice can cause the above mentioned problem.<sup>15</sup> In our case, the patient belonged to a poor backward family and had not taken medical advice due to ignorance. Large vesical stones with chronically inflamed bladder with chronic cystitis sometimes cause acute urinary obstruction and along with suppuration cause pyocystitis which can induce erosion and subsequent fistula formation.

X-ray KUB is helpful in diagnosing vesical stone. CT-IVU is very beneficial for the diagnosis of vesicocutaneous fistula due to vesical calculus.

## CONCLUSION

Vesical stone expulsion through a large vesicocutaneous fistula is extremely rare. Management of vesicocutaneous fistula with giant vesical calculus is essentially surgical. In addition to the treatment of fistula the primary condition leading to fistula formation must be treated simultaneously. Though extremely rare the possibility of giant vesical calculus should always be considered while investigating a case of vesicocutaneous fistula.

**Conflict of interest:** None declared.

**Contribution of authors:** We declare that this work was done by authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

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CASE ARTICLE

## Squamous Cell Carcinoma Over a Trophic Ulcer in a Patient with Hansen's Disease

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### ABSTRACT

*Although non healing ulcer in leprosy is a common phenomenon, yet acute malignant transformations of the same are relatively rare. This study reports a 32-year old man previously treated for Hansen's disease with a squamous cell carcinoma involving the left foot with rapid lymphatic spread. He was being treated as a benign trophic ulcer for more than 18 months until he started developing huge inguinal lymph nodes and the ulcer rapidly increased in size. Usually Squamous cell carcinoma are known to occur in ulcers of considerable duration but such rapid growth in such a short duration and rapid lymphatic spread in unusual in as seen in our case as the lymphatics are usually destroyed because of previous inflammation and scarring.*

**Keywords:** *Squamous cell carcinoma, Ulcer, Hansen's disease*

### INTRODUCTION

Leprosy or Hansen's disease is a completely curable though difficult to treat mycobacterial disease. The only mycobacterium that can damage nervous tissue, *Mycobacterium leprae* initially damages the peripheral nervous system and then secondarily involves the skin and certain other tissues. Trophic ulcers are very common in the neuropathic feet and these may turn malignant over a long period of time

### CASE REPORT

A 32-year-old man, a cultivator by occupation, was referred with a non-healing ulcer involving both feet for more than 9 months. He was not diabetic. He was previously diagnosed with Paucibacillary leprosy and was treated as recommended by the World Health Organization. The patient took rifampicin 600 mg once every 28 days and dapsone 100 mg once daily for 28 days, constituting a cycle. He completed 6 such cycles continuously within a 9-month period. On examination, both lower limb was grossly swollen and edematous with inguinal lymphadenopathy (**Figure 1**). Local examination revealed multiple ulcero-proliferative lesions involving the plantar aspect of both lower limbs up to the region of the lateral malleolus measuring approximately 15 × 10 cm over the left foot and 10cm × 8 cm over the right foot. The ulcer had everted edges and bled easily on touch. There ulcer surrounds were indurated. Examination of the inguinal region revealed bilateral inguinal lymphadenopathy with hard external iliac nodes. An edge wedge biopsy taken from the ulcer was reported as squamous cell carcinoma (SCC). Fine-needle aspiration cytology of the inguinal lymph nodes revealed a spread. A contrast computed

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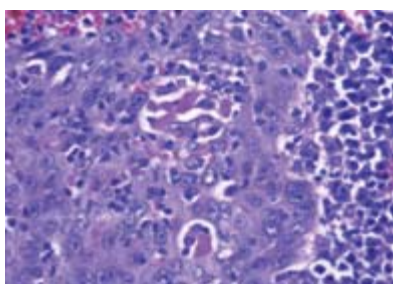


tomography scan of the pelvis and abdomen showed para aortic and external inguinal node involvement compressing the right external iliac veins with luminal thrombus. The acute presentation led to the patient being treated on the lines of chronic trophic ulcers. In this patient, the possibility of immunocompromise leading to the rapid malignant transformation cannot be overlooked.

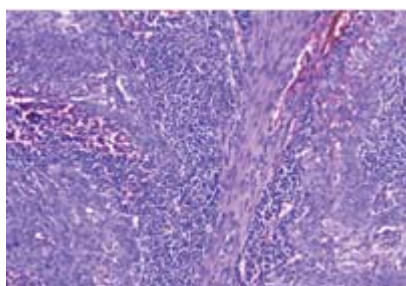


**Figure 1** Large areas of planter erosions and ulceroproliferative lesions over both feet (more on left than right) with foot deformity with shorten digits.

Ulcer on the left posterior part of sole irregular, ill-defined with hyperkeratotic crusted margins and floor showing dirty slough and unhealthy granulation tissue



**Figure 2** Histopathological examination of the lesion shows a mass of fibrofatty tissue infiltrated by groups of neoplastic cells suggestive of poorly differentiated squamous cell carcinoma ( 40X)



**Figure 3** Histopathological examination of the lesion shows a mass of fibrofatty tissue infiltrated by groups of neoplastic cells suggestive of poorly differentiated squamous cell carcinoma ( 10X)

## DISCUSSION

Ulcus Marjolini or Marjolin's ulcer was first described by Jean Nicholas Marjolin in 1828. It is the malignant transformation of any chronic wound, not restricted to burns and presents as an aggressive, ulcerating, squamous cell carcinoma (SCC) in areas of trauma, chronic inflammation, or scarring.<sup>1</sup> They exhibit slow growth and are painless, as the ulcer is usually not associated with nerve tissue, and lack lymphatic spread because of local destruction of lymphatic channels. Lymphadenopathy can be the initial manifestation of leprosy delaying the diagnosis of SCC from lymph node biopsy.<sup>2</sup> The time taken for malignant transformation in Marjolin's ulcers averages 32.5 years<sup>1</sup> but ranges between 25 and 40 years.<sup>3</sup> One case-control study concluded that ulcer duration was significantly lower in the group with malignant change. No correlations were reported between the duration of leprosy, the type and duration of leprosy chemotherapy, presence of bone involvement, and type of ulcer care treatment given.<sup>4</sup> A study conducted in northern Thailand concluded that most patients were in the Paucibacillary spectrum with trophic ulcers of 12 years duration, whereas our patient presented with malignant transformation in an acute ulcer of 12 months duration. The commonest site of involvement of squamous cell carcinoma was the proximal part of the plantar surface.<sup>5</sup> Malignant transformation was more common in plantar ulcers of long duration.<sup>6</sup> A retrospective analysis of chronic ulcers among leprosy patients in Salem, India showed more neoplastic transformation in patients in their sixth decade, the authors' patient was younger, only 32 years. Paucibacillary leprosy patients with nonhealing ulcers of the heel were reported to show a greater predilection for malignancy.<sup>7</sup> Trophic ulcers of leprosy usually present with infected growths and regional lymphadenopathy and undergo malignant transformation. Lymph nodes regress after removal of the primary and in some cases lymph nodes can be positive for malignancy.<sup>8</sup> In our patient, the clawing of the feet and the lymph nodes were attributed to the disease. The sudden erosive change in the appearance of the lesion and increase in size prompted further investigation and a diagnosis of squamous cell carcinoma was confirmed. Marjolin's ulcer is usually contained well by wide excision with a margin of at least 1 cm of healthy tissue. However, amputation is the treatment of choice when excision is complicated by bone involvement and infection.<sup>9</sup> Another method of ensuring complete local excision is the Mohs micrographic surgery.<sup>10</sup> Marjolin's ulcer is aggressive and carries a

high incidence of metastases. Smith et al,<sup>11</sup> after studying 21 patients, concluded that malignancy was more common in developing countries where active medical intervention is sought only after complications set in. Our patient sought treatment as the ulcer had been persistent for 12 months, bled on touch and this interfered with his occupation as a tailor. The patient was satisfied with the treatment decision, since he desired relief from the long-standing chronic wound. Very aggressive in nature, Marjolin's ulcers are thought to be caused by long-term, continuous mitotic activity as the epidermal cells attempt to resurface the open defect.<sup>12</sup> The presence of tumor cells prevent the healing of ulcers. It has been suggested that cellular mutations are responsible for neoplastic changes, and infection might serve as a co-carcinogen in scar tissue. It has also been suggested that patients with inherent immune deficiency are at higher risk for developing malignant ulcers.<sup>13</sup> We report this case for its atypical acute presentation, with lymph node metastasis, in a young patient, which led to overlooking of the diagnosis. The only clues here were the proximal location of the plantar ulcer and the Paucibacillary spectrum.

## CONCLUSION

In developing countries, walking bare foot is not uncommon. Trophic ulcers are regularly seen in the clinic, and a high degree of clinical suspicion can go a long way in saving the limbs.

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CASE ARTICLE

## Laboratory Diagnosis of Cutaneous (Dermal) Leishmaniasis with Hansen's Disease

**Sonowal Basanta\***

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### ABSTRACT

*Post kala-azar dermal leishmaniasis (PKDL) is a dermatosis that occurs as a sequel of visceral leishmaniasis (VL). Elimination of VL requires detection and treatment of PKDL, necessarily because of its capacity to serve as a reservoir for the causative parasite, Leishmania donovani. Diagnosis of PKDL presents a challenge due to low parasite burden in the lesions with Hansen's disease. We report such a case of Cutaneous Dermal Leishmaniasis with Hansen's disease in Guwahati in a 56 year old male patient who migrated from Bihar to Assam in Guwahati Medical College. Leprosy is a chronic infectious disease caused by M. Leprae bacilli. It affects mostly peripheral nerves and also affects the skin, muscles, the eyes, testes, bones and internal organs. This patient came to the clinical laboratory with typical clinical presentation. In this case I have carried out the routine examination of blood, cytological, AFB, histological, bone marrow examination and aldehyde test for confirmation of diagnosis.*

**Keyword:** Laboratory diagnosis, Dermal Leishmaniasis, Hansen's disease

### INTRODUCTION

Leishmaniasis, in its variety of visceral (VL), cutaneous (CL) and mucocutaneous (MCL) forms, directly affects about 2 million people per annum, with approximately 350 million individuals at risk worldwide. During the last 10 years there have been extensive epidemics of visceral form of the disease, which is also emerging as an important opportunistic infection in immunocompromised patients, especially those co-infected with HIV.<sup>1</sup> Leishmaniasis is a group of disease caused by various species of the protozoan parasites of the genus Leishmania. Leishmaniasis can be categorized in 3 major forms ranging in severity from spontaneously healing skin ulcers in cutaneous Leishmaniasis (CL), destructive mucocutaneous leishmaniasis (MCL) to fatal visceral leishmaniasis (VL). The disease remains a major health problem, being currently prevalent in 88 countries, infecting 12 million individuals and threatening 350 million people.<sup>2</sup>

Post kala-azar dermal Leishmaniasis with leprae bacilli infections are endemic in India. PKDL is a rare group of protozoal disease caused by parasite of the genus leishmania, and transmitted to man by the bite of female phlebotomine; sand fly and they are responsible for various syndromes in human beings.<sup>3,4</sup>

Co-infection post kala-azar dermal Leishmaniasis (PKDL) with leprosy is an infrequent complication. PKDL is a protozoal disease known to occur epidemically and endemically in well-defined areas in the eastern sector of the country, Assam, West Bengal, Bihar, Madhya Pradesh, Tamil Nadu and Orissa.<sup>5,6</sup>

During the eradication campaign between 1958-1964, kala-

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azar and cutaneous leishmaniasis declined to a point of extremely low endemically, but during this period, some patients with PKDL apparently acted as a reservoir of infection, since periodically new cases of kala-azar have been seen. Leprosy is a chronic infectious disease and it is a major public health problem in India and it has got long incubation period, an average of 3-4 years.<sup>7</sup> Risk factor for both the disease are poverty, malnutrition, deforestation and urbanization. Clinically kala-azar and leprosy is very difficult to differentiate from each other because sign and symptoms are almost same for both. So in this particular case, diagnosis is established by demonstration of L.D body and AFB bacilli.

Here in this case I have reported a case of co-infection by kala-azar with leprosy diagnosed with the help of cytological, hematological, histological, AFB stains and biochemical study.

### CASE HISTORY

A 56 year old male patient who migrated from Bihar to Assam a few months ago, came to the hospital with a history of treatment with some medication for his problem, which was not cured, instead increased and spread all over the body. He presented with unexplained fever, weight loss, loss of appetite, weakness, itching, redness, and progressive emaciation, hoarseness of voice etc. On examination, the patient had percutaneous nodule all over his body, hypopigmented areas both side upper part of the body, skin dryness and ulceration found at the angle of mouth, cheek and nose. Loss of sensation at the hypopigmented areas and oozing from the ulcerative areas, muscle weaknesses are also observed. Both side of the inguinal lymph node was positive, it was non-tender and fixed, liver and spleen enlarged.



**Figure 1** Nodulo-ulcerative lesion over the face (A), hypo pigmented areas on back (B)

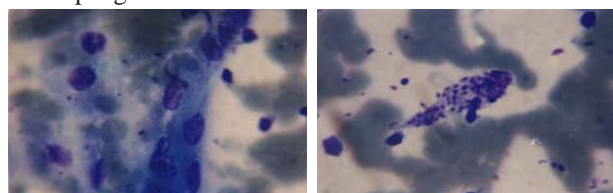
### DIFFERENT LABORATORY METHODS

Routine Blood examination: TC- 4000, DLC- 46+50+1+3, Hb-9.6gm/dl, ESR- 112 AEFH

Routine urine examination is normal.

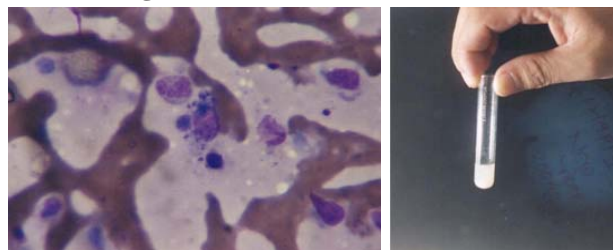
**Biochemical Test** shows increase IGE and SGOT, SGPT.

**HAEMATOLOGICAL TEST:** Leishmanstain's from peripheral blood-smear reveals engulfing body by macrophages.



**Figure 2** PBS shows presence of L.D. Bodies singly and clusters

**Bone marrow aspiration's** smear reveals L.D. body as shown in **Figure 3 (A)**.

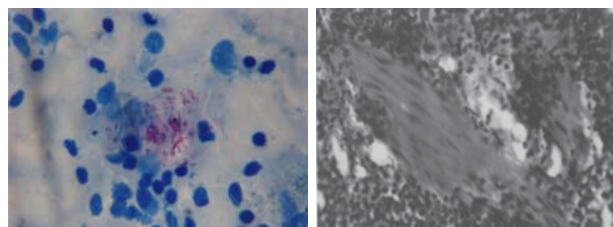


**Figure 4 (A)** Bone marrow findings of LD Body (Giemsa Stain), **(B)** Aldehyde Test (+++)

**Cytological Examination:** Giemsa stains-smear taken from the ulcerative sites- smear reveals L.D. body lying singly and clusters.

**Formal Gel Test:** Aldehyde test was strongly positive (+++) as shown in **Figure 5 (B)**.

**Slit's smear for AFB:** Zeihl nelson stains smear reveals clusters and Globi of AFB bacilli and also the histological section shows thicken nerve fibers with inflammatory changes as shown in **Figure 4**.



**Figure 6 (A)** Zeihl Nelson stains reveals clusters and Globi of AFB bacilli, **(B)** H and E section shows thicken nerve fibers with inflammatory changes



## DISCUSSION

Here, the diagnosis of Cutaneous Dermal Leishmaniasis with Hansen's disease is based on clinical and epidemiological parameters. Demonstration of parasite in the slit smear or by culture of the dermal tissue is considered to be the gold standard, but the methods involved are invasive, less sensitive (58%) and difficult to perform in field conditions.<sup>8</sup> As the patient was diagnosed with co-infection by Kala-azar and leprosy all the possible laboratory tests has been done. The patient clinical finding for Kala-azar and leprosy goes for the favours of the disease and this is confirmed by clinical and positive laboratory findings. As the clinical findings of the patient have darkening of face, hands, feet, abdomen is the common site of the patient in tropical areas. Sometimes diffuse cutaneous Leishmaniasis<sup>9</sup> may confuse with leprosy because the agent is restricted to the skin. This patient has ulcer at the angle of mouth, nose, hypopigmented area both side of the back redness some areas of the body. To measure of nerve conduction test was positive and it is a favor for the clinical diagnosis of the leprosy concomitantly with kala-azar. **Table 1** shows the diagnostic evidence of kala azar and leprosy.

**Table 1** Diagnostic evidence of kala azar and leprosy

Direct Evidence	Indirect Evidence
Peripheral blood smears examination.	Haemogram reveals anemia and leucopenia.
Blood culture	Serological test
Biopsy	Aldehyde test
Bone marrow examination	CFT, Immunological assay
Blood culture also done for L.D body in a case of kala azar	

Methods for the diagnosis of VL often lack sensitivity or specificity for the diagnosis as (i) the number of parasites in skin smears and biopsy specimens is often low, thus requiring prolonged searches by routine microscopy.<sup>8, 10, 11</sup>

In this particular case with typical clinical presentation and the most significant laboratory finding was demonstration of Donovan bodies in peripheral blood smear by Giemsa and leishman's stains. Identification of L.D bodies in bone marrow and cytological smear appears as ovoid or rounded body measuring 1-3 mm in length and lying intercellularly in monocytes, polymorphs or endothelial cells.

For better control management of Kala-azar, control the reservoir and treat with sodium stibogluconate. To measure of leprosy medical measures like multi-drug therapy, health education, immunoprophylaxis, rehabilitation and social support are some of the important measurement.

## CONCLUSION

Kala-azar is not completely eradicated in the tropical countries like India and some cases are found periodically in north eastern part of India and all the age group irrespective of sex are the sufferer.

Leprosy and kala-azar are the major public health problem in India and it has a similar immunological spectrum that occurs concomitantly in the endemic region.

VL transmission in India is thought to be anthroponotic and in the absence of animal reservoirs, PKDL patients are deemed singular source of the parasite *L. donovani*. Therefore, rapid, sensitive and specific tools for identifying *dermal leishmaniasis* are required because they are highly desirable that would allow control interventions in endemic area of VL, a prerequisite for successful elimination of VL.

**Conflict of interest:** None declared.

**Consent of the case:** Inform consent taken.

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CASE ARTICLE

## Myocardial Infarction or Cardiac Tamponade? Forensic Dilemma

*Chakrabarti Jayanta Sankar<sup>1</sup>, Nath Anamika<sup>2</sup>, Chakraborty Pradipta Narayan<sup>3</sup>*

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### ABSTRACT

*Sometimes, two consequent findings make it difficult for the autopsy surgeon to decide upon the cause of death. When two causes of death co-exist, several factors have to be taken into consideration to measure the gravity of each, which might have resulted into death. We present here, a case report of an autopsy conducted on a 57 year old man, who suffered from reeling of head and a fall from standing position at the emergency department and eventually succumbed, before treatment could be initiated. Autopsy revealed cardiac tamponade and myocardial infarction in the deceased. Cardiac tamponade may occur as a result of rupture of myocardial wall and is mainly observed in rupture of ventricles, but the incidence is as low as 2 in 10,000. There are several other causes of cardiac tamponade though. Myocardial infarction on the other hand is the leading cause of mortality and morbidity amongst non-communicable diseases and affects men above 40 years more than their counterpart.*

**Keywords:** Autopsy, cardiac tamponade, myocardial infarction

### INTRODUCTION

Cardiac tamponade is caused by an increase in pericardial pressure due to collection of blood, pus, other fluid, or gas in the pericardial space. This hampers contraction and relaxation of myocardium and ventricular filling and expansion of heart. Cardiac tamponade may occur due to various causes. One such cause is following rupture of myocardial wall. This is a rare complication post myocardial infarction and may lead to sudden unexpected death. According to National Centre of Biotechnology Information, cardiac tamponade occurs in 2 out of 10,000 cases only. Myocardial infarction is responsible for highest morbidity and mortality worldwide.<sup>1</sup> In India, 31.7% of deaths occur due to myocardial infarction and the incidence of cardiovascular diseases being 7% in 1970 has significantly raised up to 32% in 2011.<sup>2</sup> The burden of Coronary Artery Disease in Indian subcontinent is huge and is mainly due to population explosion and high risk factors like smoking, alcohol, low fruit and vegetable intake, physical activity, obesity, high blood pressure and abnormal lipids and diabetes amongst the mass.<sup>3</sup>

### CASE REPORT

A 57 year old man, contractor by profession, came to the emergency department of AGMC with complains of headache and discomfort. As his blood pressure was high he was advised ECG which revealed ST elevation and T wave inversion for which he was advised immediate admission, but he refused and went back home. Two hours later, he was brought back to the hospital with a history of headache and a fall from standing position chest pain and disorientation and thus succumbed before any treatment could be initiated.

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## AUTOPSY FINDINGS

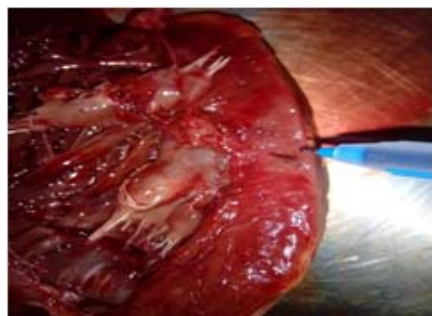
Dark brown complexion and was of average built. Pallor, rigor mortis was present with post mortem staining on the back of the trunk, thighs and legs, which was fixed. On dissection, 500 gm of clotted blood were found inside the pericardial cavity surrounding the heart (**Figure 1**). Heart weighed 490 gm. Rupture of left ventricle was present, 5cm above the apex of the heart measuring 1.5cm x 0.8cm x cardiac cavity deep (**Figure 2**). On dissection of the heart, an infarct area measuring 2.5cm x 1.8cm in the left ventricular wall was present (**Figure 3**). On cut section, hemorrhage in the walls of the left ventricle around the ruptured area was seen (**Figure 4**). Atherosclerosis was found in the anterior descending branch of left coronary artery and in the right coronary artery.



**Figure 1** Blood in pericardial sac causing cardiac tamponade



**Figure 2** Rupture site at left ventricle



**Figure 3** Cut section of heart shows the pale infarct area



**Figure 4** Cut section of the ruptured site shows haemorrhage

## DISCUSSION

Cardiac tamponade may occur due to dissecting aortic aneurysm (thoracic), lung carcinomas, acute myocardial infarction, heart surgery, pericarditis caused by bacterial or viral infections, trauma to the heart. Other uncommon causes include tumors of the heart like myxoma, acute renal failure, hypothyroidism, leukaemias, introduction of central lines, chest irradiation, invasive heart procedure like angiography or cardiac catheterization, metastasis in the pericardial sac from breast, lungs and other cancers and SLE. The main signs and symptoms include anxiety, restlessness, sharp chest pain which may be radiated to the neck, shoulder, back, or abdomen, and worsens with deep breathing or coughing, difficulty in breathing, discomfort, sometimes relieved by sitting upright or leaning forward, fainting attack, light-headedness, palpitation, increased respiratory rate, dizziness, drowsiness, weak or absent pulse. Rupture of the myocardium is a rare but an early complication of acute myocardial infarction. The time of rupture is usually during 1 to 14 days post myocardial infarction. The site of rupture may be at the wall, papillary muscles or at the intraventricular septum.<sup>4</sup> It has been statistically proved that the most common cause of cardiac tamponade is accumulation of blood in the pericardial sac, occurring from rupture of the myocardium in a case of an infarct.<sup>5</sup> In this case the deceased had an episode of reeling head and on measurement, blood pressure was high on his first presentation. ECG recordings showed suspected myocardial infarction, as there were ST elevation and T wave inversion but he refused admission. Two hours later in his second presentation, he had chest pain, fainting attack, low blood pressure and absent pulse which signifies rupture of the myocardium, followed by haemo pericardium leading to cardiac tamponade. Due to accumulation of blood in the pericardial sac, there was increased pressure on the heart, leading to chest pain.



Cardiac tamponade caused pooling of blood and decreased venous return, which resulted in the fainting attack, low blood pressure and absent pulse. So, the question arises as to what was the ultimate and immediate cause of death. Myocardial infarction is the leading cause of death and cardiac tamponade is a medical emergency and a cause of sudden death. In this case though the man survived after myocardial infarction, but the sudden rupture of the ventricles causing pooling of blood in the pericardial sac and thereby cardiac tamponade eventually contributed to his death. A study conducted on the frequency of left ventricular wall rupture shows that cardiac tamponade has increased following advent of thrombolytic therapy and has been on the spree since then and now a cause of hospital deaths in myocardial infarction patients.<sup>6</sup> Sedentary life style with decreased physical activity is a high risk factor for myocardial infarction is shown in another study.<sup>7</sup> In another study, it is shown that with increasing age there is higher incidence of myocardial infarction if there is decline in physical activity.<sup>8</sup> Men are at a higher risk of having myocardial infarction and women after menopause have similar incidence as their male counterparts. In one study, it is revealed that certain features exacerbate left ventricular rupture secondary to myocardial infarction. These are age above 55 years, 1<sup>st</sup> transmural infarction, Killip class I or II, persistent ST segment elevation, persistent or recurrent chest pain, sudden or progressive hypotension, and sudden electromechanical dissociation.<sup>9</sup> Timely intervention is the only mantra behind survival after cardiac tamponade. The quickest and most sensitive imaging test to confirm cardiac rupture is a trans-thoracic echocardiography and should be done at the earliest.<sup>10</sup>

## CONCLUSION

Awareness about life style modification should be propagated amongst the common mass in order to decrease non-communicable diseases like myocardial infarction. Early medical help should be sought after, in cases of chest pain, irrespective of the age of the patient. Early initiation of treatment can save lives and reduce mortality and complications like cardiac tamponade following myocardial infarction.

**Contribution of authors:** We declare that authors named in this article did this work and all liabilities pertaining to claims relating to the content of this article will be borne by us.

**Conflict of interest:** None.

**Declaration:** This article has not been submitted anywhere for publication.

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CASE ARTICLE

## Intra Abdominal Desmoplastic Small Round Cell Tumour - A Case Report

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### ABSTRACT

*This case report is prepared to discuss the very rare highly malignant neoplasm that characteristically present as a single mass within the abdominal cavity. FNAC revealed intra abdominal small round blue cell tumour. Histological feature is the characteristic display nests of malignant small round cells within a florid desmoplastic stroma.*

*An unusual feature of this tumour is its polyphenotypic differentiation with simultaneous trilinear coexpression of epithelial (CK, EMA), neural (NSE, S100 protein) & myogenic (Desmin, Vimentin) markers.*

**Keywords:** DSRCT, Polyphenotypic, FNAC

### INTRODUCTION

DSRCT (Desmoplastic Small Round Cell Tumour) is a rare, high-grade malignant tumour, chiefly affects adolescent and young adult specially males, between 15 to 35 yrs of age. It occurs predominantly in the abdomen i.e. any portion of peritoneal cavity, omentum, retro peritoneum and frequently confined to pelvis. 'So, it presents as a large mass within the abdomen and may be accompanied with extensive tumour implants throughout the peritoneum. Although most tumours arise in abdomen/pelvis, these lesions can occur in extra-abdominal locations like CNS (Central Nervous System), pleura and paratesticular region. It pursues an aggressive clinical course with an extremely poor prognosis. The lesion is characterized by a proliferation of small round cell deposited in an abundant desmoplastic stroma and multiphenotypic differentiation by immunohistochemistry.<sup>2,3</sup>

### CASE REPORT

A 22 year old male patient came to the surgery OPD with a large mass in his abdomen for a period of 3 months. Physical examination of the patient showed 12 x 9 x 5 cm hard ovoid mass in the epigastric and hypo gastric region. No ascitis was found. A detailed systemic examination and laboratory investigations were done which were within normal limit. Ultrasonography revealed a huge intraabdominal soft tissue mass with diffused tiny calcified spots without obvious organ of origin. Ultrasound guided FNAC was carried out from different site of the mass.

A fine needle aspiration cytology (FNAC) of the lesion revealed malignant small round cell tumour.

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On laparotomy a large mass was detected in the greater omentum, without any identifiable visceral site of origin. The mass (tumour) was excised and sent for histopathological examination in 10 % formalin solution.

Grossly the specimen measured (12 x 8 x 4)cm, solid boss elated mass, hard to cut. Cut surface was gray in colour with areas of cystic changes and necrosis [Figure 1(a), 1(b)]. Paraffin embedded sections was prepared from different parts of the tumour and were studied by H&E stain, PAS stain and IHC stain.

Microscopically, H&E stained section showed sharply demarcated nests and trabeculae of small round tumour cells separated by a well-defined, florid desmoplastic stroma [Figure 2(a), 2(b)]. Irregular shaped large island of tumour cells with cystic change and necrosis are surrounded by broad band of desmoplastic stroma. [Figure 2(c)]. Stroma is composed of mixture of fibroblastic and myofibroblastic cells.

Immunohistochemical stains were done using a panel of antibodies against Cytokeratin, Desmin, Vimentin, NSE and Chromogranin. IHC stain for Cytokeratin shows diffuse cytoplasmic reactivity [Figure 3(a)]. Desmin shows perinuclear dot like pattern of staining. Desmin formed globoid or punctate paranuclear mass within the tumour cells [Figure 3(b)]. Immunostain for Vimentin showed positive reaction both for tumour cells and surrounding stroma [Figure 3(c)] Chromogranin was negative.

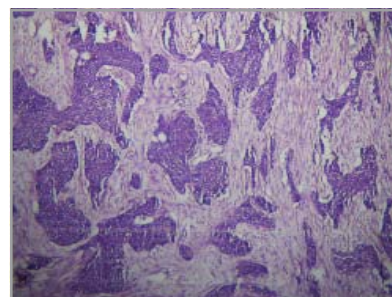
Taking into consideration of clinical feature, FNAC findings, appearance of the tumour, characteristic histological and immunohistoprofile, the case was diagnosed as Intra Abdominal Desmoplastic Small Round Cell Tumour.



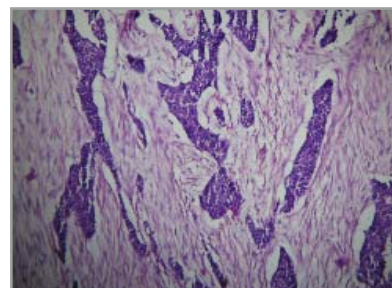
**Figure 1 (a)** Gross photograph of the Specimen with omentum



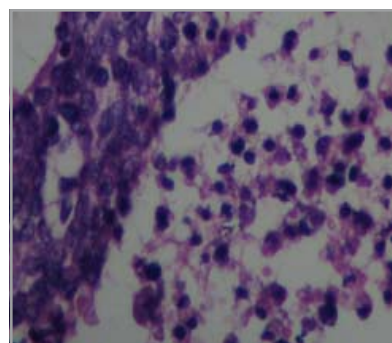
**Figure 1 (b)** Cut surface of the tumor showing gray-white, areas of necrosis and cystic change



**Figure 2(a)** Sharply demarcated nests of tumor cells separated by a florid desmoplastic stroma (H & E X 200)

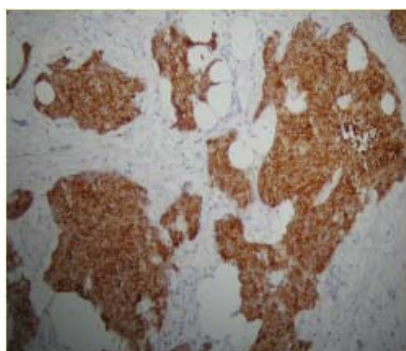


**Figure 2(b)** Trabeculae of tumor cells separated by a florid desmoplastic stroma (H & E X 200)

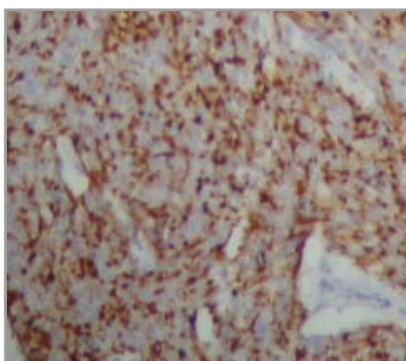


**Figure 2(c)** Higher magnification to show cystic space with central necrosis in a large irregular nest, surrounded by broadband of desmoplastic stroma

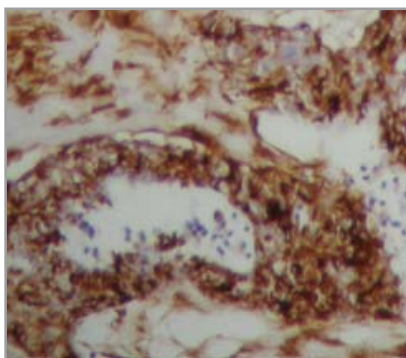




**Figure 3(a)** Immunohistochemical stain for Cytokeratin shows diffuse cytoplasmic reactivity (IHC X 100)



**Figure 3(b)** Immuno stain for Desmin shows perinuclear dot like pattern of staining (IHC X 100)



**Figure 3(c)** Immuno stain for Vimentin shows positive reaction both for tumor cells and surrounding stroma (IHC X 200)

## DISCUSSION

Gerald W described the first case of DSRCT in 1989 and Rosai J.<sup>4</sup> The incidence of DSRCT is difficult to estimate because of its rarity. This aggressive malignancy is found predominantly in pediatric age group and young adult with a sex ratio (male to female) 3:1.

DSRCT is descriptively named malignancy of uncertain histogenesis. Although due to its site of presentation with predilection for serosal involvement, initially it was thought that it may be a primitive tumour of mesothelial origin. But it is now hypothesized to arise from progenitor cell with multiphenotypic differentiation. As the name implies, histologically it is composed of sharply outlined islands of small round tumour cells separated by a distinct dense desmoplastic stroma.<sup>2,3</sup>

An unusual feature of this tumour is its polyphenotypic differentiation with simultaneous trilinear coexpression of epithelial, neural and mesenchymal markers.<sup>4,5,6</sup> Tumour often expresses Desmin, Vimentin, EMA, CK, NSE and S100 protein. One of the promising markers is an antibody to Desmin. Perinuclear dot like pattern is a unique pattern of Desmin immunoreactivity peculiar to DSRCT.

Genetically the tumour is characterized by a unique reciprocal translocation (11:22) (p13/q12) involving the EWS gene on chromosome 22 & WT1 gene on chromosome 11 to produce EWS and WT1 fusion gene transcript. This transcript code for a chimeric protein acts as a transcriptional activator and fails to suppress tumour growth.<sup>7,8</sup>

Genetic studies provide valuable support to pathological diagnosis where rare morphological variant like stroma poor tumour, tumour with rhabdoid like cells, glandular or tubular forms or aberrant immunoreactivity is encountered.<sup>9</sup> Moreover to establish and to confirm diagnosis, genetic study is essential. This malignancy puts diagnostic and therapeutic problems, indeed diagnosis can be suspected by radiologic and histologic features but it is asserted by immunohistochemical and cytogenetic study<sup>10,11</sup> because of the large number of differential diagnosis and anatomo-pathologic polymorphism.

Intra-abdominal small round cell tumour like Neuroblastoma, PNET, extra skeletal Ewings sarcoma, Embryonal and Alveolar Rhabdomyosarcoma, NHL and some other less frequent tumour like small cells carcinoma, Undifferentiated carcinoma and malignant Mesothelioma were included in the differential diagnosis of DSRCT.

Neuroblastoma can be distinguished from DSRCT with elevated levels of urinary catecholamines and their product, presence of fibrillary neuropils and HW pseudorosettes in histology and positive IHC reaction for NSE, Chromogranin, Synaptophysin and negative



reaction to EMA Vimentin. Microscopically, tip off to the diagnosis for PNET and EWS are (a) Lobular peritheliomatous growth pattern with areas of geographical necrosis and (b) PAS positive glycogen rich cytoplasm. CD99 is highly sensitive marker for PNET and EWS and negative for epithelial marker. Presence of consistent chromosomal translocation (11:22) (q24/q12) with production of chimeric fusion gene transcript EWS/FLI-1 is confirmatory for diagnosis.

Rhabdomyosarcoma (Embryonal and Alveolar) can be differentiated from DSRCT by careful analysis of presence of variable cells like strap, racket, ribbon and tadpole with presence of bi or tri nucleation, prominent nucleoli and abundant eosinophilic cytoplasm. Immunohistochemically positive for muscle marker and negative for epithelial and neural marker. Although DSRCT shows myogenic differentiation with positive Desmin reaction MyoD1 and Myogenin are negative in DSRCT, whereas they are strongly positive in Rhabdomyosarcoma.

No curative treatment has been yet documented; current therapeutic options include multiagent chemotherapy, aggressive surgical debulking and radiotherapy.<sup>12, 13</sup>

## CONCLUSION

Although DSRCT is a rare tumour it has distinctive clinical feature, appearance and a unique cytogenetic profile with young male predominance and aggressive biological behavior that distinguishes it from other round cell tumour.

**Conflict of interest:** None declared

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CASE ARTICLE

# Multifocal Polyostotic Craniofacial Fibrous Dysplasia

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## ABSTRACT

*An extremely rare case of craniofacial fibrous dysplasia with multifocal involvement of bilateral maxilla and mandible in a 17 year old male patient is reported. The genetic basis, etiopathogenesis, progression, clinical-radiological features and treatment of fibrous dysplasia are reviewed and presented.*

**Keywords:** Fibro-osseous lesions [FOL], Skeletal Disorders, Polyostotic disease

## INTRODUCTION

The benign fibro-osseous lesions [FOL] of the jaws comprise and constitute a diverse, interesting, and challenging group of conditions with a striking common histological characteristic – substitution of normal bone by a tissue composed of collagen fibres and fibroblasts that contain varying amounts of mineralized substance, which may be bony or cementum-like in appearance.<sup>1</sup>

The fibro-osseous lesions of the craniofacial region includes: fibrous dysplasia, periapical cemento-osseous dysplasia, focal cemento-osseous dysplasia, florid cemento-osseous dysplasia, and cemento-ossifying fibroma.<sup>2</sup>

Of these, FD is a congenital but non-inheritable benign, sporadic, developmental dysplastic, skeletal disorder that accounts for 7% of all benign bone tumors. It is described as a tumor-like condition that is characterized by replacement of normal bone with an excessive proliferation of fibrous connective tissue with irregular trabecular bone.<sup>3,4</sup> Further, FD can affect one bone (monostotic form), or multiple bones (polyostotic form), or present as Jaffe-Lichtenstein Syndrome (JLS) comprising of polyostotic FD with café 'au-lait' pigmented skin lesions and McCune-Albright syndrome (MAS) which also has the additional features of hyperfunctional endocrinopathies as precocious puberty, hyperthyroidism or acromegaly. The craniofacial bones are affected in about 10% of the cases of monostotic FD and in 50% to 100% cases of polyostotic FD. The term craniofacial FD is used when there is singular involvement of only the cranial and facial bones by the disease process.<sup>3,5,6,7</sup>

## CASE REPORT

A 17 year old male patient reported to the department of craniofacial surgery in April 2014 with complains of a

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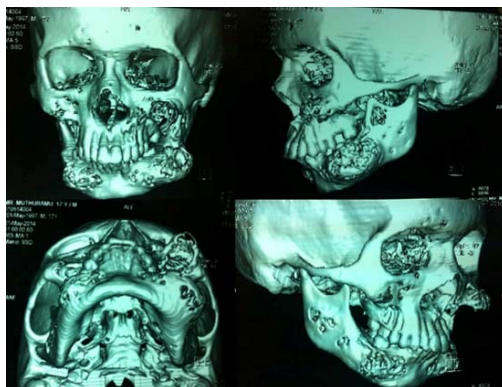
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progressively expansile mass of the face for the past 7 years, noticeable since 10 years of age. On clinical examination he presented with gross facial asymmetry involving bilateral maxilla and mandible left side > right side (**Figure 1**). On palpation, the swelling was bony hard in consistency with cortical expansion.

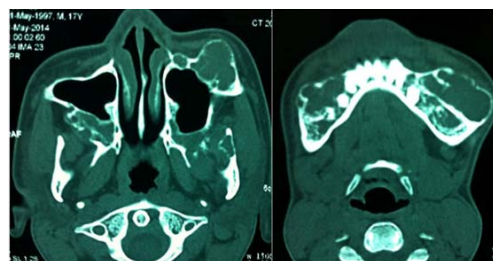


**Figure 1** (L to R) Frontal, Worm's view, right and left lateral view – demonstrating extensive bony expansion with gross facial asymmetry with left side involvement > right side

Although the clinical presentation was suggestive of involvement of the facial bones on the left side, a computed tomography image demonstrated panfacial involvement of bilateral maxilla and mandible. The extents of growth did not involve vital structures in the vicinity. There were no functional impairments despite extensive involvement of the facial skeleton (**Figure 2& 3**).

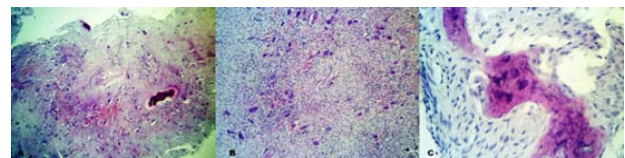


**Figure 2** Volume rendered 3D computed tomography images demonstrating panfacial involvement with multilocular expansile fibro-osseous lesions



**Figure 3** Coronal sections demonstrating extent of involvement in the maxilla and mandible

A previous incision biopsy done in 2008 was suggestive of peripheral giant cell granuloma. Patient had not continued treatment then and presented to this facility as the growth was progressive. Following routine surgical workup and biochemical investigations which were under normal parameters, a trephine bone biopsy was done and specimen was sent for histopathological examination (HPE). The final HPE report was “*multifocal polyostotic fibrous dysplasia*” (**Figure 4**). Following HPE diagnosis, a staged surgical work up was formulated and it was decided upon to operate the left side first as it was cosmetically more disfiguring. The extent of bony expansion was not disfiguring on the right side, hence immediate surgery was deferred.



**Figure 4** (L to R): Representative areas of HPE sections demonstrating A: Cellular tumour comprised of proliferative spindle cells, giant cells and bony trabeculae; B. Spindle cells are arranged in pattern less manner admixed with numerous multinucleated giant cells; C. Metaplastic bone formation which is characteristic of fibrous dysplasia and appears irregular due to the dissection by surrounding spindle cells

Under general anesthesia, access to the lesion on the left maxilla was gained through a Weber-Fergusson incision and mandible through an Apron incision. Extensive cortical expansion of the involved bones and a thin overlying mucosa obviated the use of transoral approaches. The bony prominences were removed and the remaining bone was recontoured (**Figure 5**). The post operative period was uneventful and patient was discharged on sixth post operative day. He has been followed for a period of 1 year. There has been no clinical and radiological evidence of recurrence and soft tissue remodelling has also been adequate (**Figure 6 and 7**).



**Figure 5** 1<sup>st</sup> row (L to R) Marking for Weber-Fergusson incision, Exposed lesion, Recontoured bone; 2<sup>nd</sup> Row (L to R) Lesion exposed through a left Apron incision, Recontoured bone, Closure at both sites





**Figure 6** (L to R) At the time of presentation, 3<sup>rd</sup> post of month, 6<sup>th</sup> post op month and 1 year post operative period. Progressive soft tissue remodelling and restoration of facial symmetry is evident



**Figure 7** (L to R) Post operative (1 year follow-up) multiplanar reconstruction (MPR) and volume rendered 3D reconstruction image series demonstrating disease free left maxilla and mandible region

## DISCUSSION

Fibro-Osseous lesions [FOL] are constituted by a group of lesions which are known to affect the jaws and the craniofacial bones and are regarded as very confusing area in diagnostic pathology.<sup>7</sup> Most of these lesions are of unknown aetiology, while some lesions are believed to be neoplastic while others are related to metabolic disturbances.<sup>8</sup>

No universally accepted system of classification exists for these lesions, however concept of categorization has been widely used (**Table 1**).<sup>9</sup>

**Table 1** Classification schemes of Fibro-Osseous Lesions

Charles Waldron classification of the fibro-osseous lesions of the jaws (1985)
Working classification of fibro-osseous lesions by Mico M. Malek (1987)
Peiter J. Sloodweg & Hellmuth Muller (1990)
WHO classification (1992)
Waldron modified classification of fibro-osseous lesions of jaws (1993)
Brannon & Fowler classification (2001)
WHO classification of fibro-osseous lesions of jaws (2005)
Paul m. Speight & Roman Carlos classification (2006)
Eversole classification (2008)

Although various classification systems have gained acceptance and usage, Waldron's classification system is most recognized. The classification system of Waldron has suggested that the FOL originates from the periodontal ligament which contains multipotent cells which are known to differentiate into fibrous tissue cells, cementum and bone. From a clinical stand point the Modified Waldron classification of FOL (1993) is most relevant – **Table 2**.<sup>9,10</sup>

**Table 2** Modified Waldron's classification of fibrous lesions of the jaw (1993)

1. Fibrous Dysplasia
2. Cement-Osseous Dysplasia
a. Periapical Cement-Osseous Dysplasia
b. Focal Cement-Osseous Dysplasia
c. Florid Cement-Osseous Dysplasia
3. Fibro-Osseous Neoplasm
a. Cementifying Fibroma
b. Ossifying Fibroma
c. Cement-Ossifying Fibroma

FD was first described by von Recklinghausen in 1891 in a patient with skeletal deformities due to fibrotic bone changes and was termed “osteitis fibrosa generalisata”. The disorder became known as “fibrous dysplasia” in 1938, when Lichtenstein introduced the term. The lesions of fibrous dysplasia were further subdivided by Schlumberger in 1946 as monostotic fibrous dysplasia when he described a single-bone involvement by the disease process.<sup>4</sup> When multiple bones are involved, it is termed polyostotic. In addition to these forms, Jones described hereditary familial form of localized FD, which is called Cherubism. McCune-Albright syndrome and Jaffe-Lichtenstein syndrome are the other variants of the disease.<sup>3,4,11,12,13</sup>

Although its actual incidence is not known, it accounts for between 2.5 and 10 percent of all bone tumors. Gender prevalence of FD is equal, although some authors suggest a female predilection.<sup>3</sup> The monostotic form is more common and affects the 20 to 30 year age group. Polyostotic FD has its onset mainly in children younger than 10 years of age the lesions grow with the child and stabilize after puberty and skeletal maturity. Although described as a non-familial, congenital bone disorder, it usually manifests before third decade of life.<sup>1,5,6</sup> Our case fell within the age group described.

The pathogenesis of FD has been theorized for many years, with causes attributed to trauma, developmental disturbances, and neurologic etiology. The genetic basis



of disease is now established and the various forms of FD occur as a result of postzygotic somatic activating mutation of the gene that encodes for GNAS 1 (guanine-nucleotide-binding protein,  $\alpha$ -stimulating activity polypeptide 1) in the bone marrow cells, resulting in locally increased stimulatory activity of adenylyl cyclase and cAMP.<sup>4</sup> This mutation leads to increased production of C-fos protein and interleukin-6 (IL-6) that result in classic dysplastic bone of FD. The severity of the condition depends on the postzygotic life and in which cells, mutation occurs. As the mutation takes place in a somatic cell rather than a germ cell, only the lineage from the affected somatic cell will express the abnormal GNAS 1 protein whereas the remainder of the cells will continue to develop normally. This phenomenon of variable expressivity is termed “*somatic mosaicism*” and is a characteristic genetic concept. The associated endocrinopathies are the result of constitutive activation of G protein coupled receptor by hormones acting through it including luteinizing hormone (LH), follicle stimulating hormone (FSH), thyroid stimulating hormone (TSH) and growth hormone regulating hormone (GHRH), thereby manifesting as gonadotropin independent precocious puberty (GIPP).<sup>3, 4, 5, 11</sup>

Craniofacial FD typically presents during early childhood, at around 10 years of age and then progresses throughout adolescence. Craniofacial involvement in FD is seen in both monostotic and polyostotic forms. Craniofacial involvement occurs in about 30% of monostotic FD and typically affects the maxilla, mandible and rarely the calvarium. In the polyostotic form of the disease any cranial or facial bone can be affected by FD and the clinical features will depend upon the bone affected, site affected, extent, duration and nature of lesion.<sup>1, 3, 4, 5, 9</sup> Signs and symptoms of craniofacial FD are a gradual, initially painless enlargement of the involved bones manifesting as facial or cranial asymmetry and deformity. Other symptoms of craniofacial FD are result of constriction of cranial foramina or obliteration of any bony cavities. These include anosmia, orbital dystopia, diplopia, proptosis, blindness, epiphora, strabismus, facial paralysis, hearing loss, tinnitus, nasal obstruction, malocclusion and interference with mastication and speech.<sup>4</sup> In the present case, facial deformity predominated as the presenting complaint and there were no functional impairments.

The proportion of mineralized bone to fibrous tissue in the lesion determines the radiological features of

craniofacial FD. Early lesions are usually radiolucent, either unilocular or multilocular and with ill-defined or well-defined borders. As the lesion matures, the lesions are characterized by a mixed radiolucent/ radiopaque appearance.<sup>3</sup> The density and trabecular pattern of FD lesions are variable. Rare cases of FD may appear to have granular internal septa, mimicking a multilocular appearance. The abundant abnormal and irregularly shaped trabeculae render a variable radiopaque pattern which may have a granular appearance (ground-glass appearance, resembling the small fragments of a shattered windshield), a pattern resembling surface of an orange peel (peau d’orange), a wispy arrangement (cotton wool), a swirling pattern similar to a fingerprint or as a very rare radiographic ‘sunray’ appearance.<sup>13</sup> In the present case, the CT image revealed a ground glass appearance of the affected areas. The other modalities for diagnosis and evaluation include magnetic resonance imaging (MRI), and radionuclide scans. In MRI, FD lesions are characterized by a decreased signal as well as sharply demarcated borders on both T1- and T2- weighted images.<sup>5</sup> Owing to the diffuse microscopic ossification in FD which allows increased dye uptake in affected areas, radionuclide scans like bone scintigraphy have high sensitivity but low specificity and are helpful in determining the activity and potential multicentricity of lesion. Single positron emission tomography (SPECT) has greater sensitivity in detecting FD involved areas in the bones.<sup>5,6,8</sup>

Treatment options can broadly be divided into 4 categories –observation, medical therapy, surgical remodelling, radical excision and reconstruction. Optic nerve decompression in cases of optic canal involvement can be classified as therapeutic or prophylactic. The procedure is performed in patients with decreasing visual acuity.<sup>4,5</sup>

Observation as a choice of treatment is indicated for patients with small asymptomatic lesions and those that are cosmetically acceptable. Medical therapy usually consists of treatment with bisphosphonates – intravenous pamidronate, oral alendronate, intravenous zoledronate.<sup>3</sup> <sup>11</sup>More recently intravenous neridronate has also been advocated in the treatment of FD.<sup>14</sup> The benefits of bisphosphonate therapy include reduced bone pain as result of suppressed osteoclastic activation and decrease in bone alkaline phosphatase (BAP) levels and other bone turnover markers (BTMs). Long term (>5 years) bisphosphonate therapy is associated with severe suppression of bone turnover (SSBT). Bisphosphonate

use is also associated with a poorly defined risk for the development of osteoradionecrosis of jaws.<sup>11</sup>

Surgery is the choice of treatment and is aimed at restoring function and aesthetics. The timing of surgery is usually delayed till puberty as it undermines the rationale that there is cessation of further lesion growth. Surgery usually comprises of contouring the bone, debulking and or surgical resection. The current treatment algorithm for surgical resection for the management of craniofacial FD by aggressive, radical surgery for resection of diseased bone was proposed by Chen and Noordhoff<sup>15</sup>, and is accepted and followed universally (**Table 3**).

**Table 3** Chen and Noordhoff – Treatment Algorithm for Surgical Management of Craniofacial Fibrous Dysplasia

Zone 1	Fronto-orbito-malar regions	Aesthetically critical zone. Reconstruction with simple bone grafting after resection
Zone 2	Hair bearing scalp	Not of esthetic concern. Treatment is optional
Zone 3	Central skull base including sphenoid, pterygoid, petrous temporal bone	Difficulty in surgical access. Observation is the choice of recommendation
Zone 4	Maxilla and Mandible	Conservative management

With the advent of microvascular surgery, free tissue transfer and dental implantology, definitive management of zone 4 lesions are now possible. Extensive lesions of the maxilla and mandible can be managed by radical resection; choice of reconstruction based on the nature, extent and involvement of the disease and staged oral and dental rehabilitation. In the present case, the lesions on the left maxilla and mandible were more extensive, cosmetically disfiguring than those on the right side, but with no effect on function and follow up after 1 year, post surgery and repeat CT scans demonstrated no obvious recurrence on the operated side and further growth on the right side.

## CONCLUSION

Although FD presents it as non-malignant, potentially self limiting disease, the resultant disfiguration and functional impairments often warrant a radical approach to the disease. Surgical planning, decision making and definitive treatment are patient based and vary depending on the clinical situation.

**Consent from the patient:** Consent has been taken

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CASE ARTICLE

## Crime Scene Visit in Determining the Manner of Death in an Unusual Case of Hanging

*Debbarma Antara<sup>1</sup>, Chakrabarty Suman Kumar<sup>2</sup>*

*Received on June 27, 2015; Accepted (revised) on September 27, 2015*

### ABSTRACT

*Determining the manner of death in an unusual case of hanging is a dilemma for all members of the judiciary system, especially forensic medicine doctor and forensic scientists. This case report depicts a very unusual case of hanging of a young adult male in his own house with his hands tied in front. This created a huge hue and cry among the common public for their age-old belief on homicidal hanging. However, a meticulous crime scene investigation and a postmortem examination helped in shedding light on the manner as unusual case of suicidal hanging rather than homicidal hanging.*

**Keywords:** Unusual case of hanging, suicidal hanging

### INTRODUCTION

Differentiating between a suicidal hanging and homicidal hanging suddenly becomes difficult due to the unusual ways adopted by the victim and the complexity thus posed. Thus investigating these unusual cases of suicide provides considerable challenge to the authority not only because of the complexities of the case but also because of public pressure and their misbeliefs.<sup>1</sup> A joint venture of meticulous crime scene investigation followed by equally meticulous autopsy along with circumstantial evidence and data collection definitely helps in reaching a verdict.

### CASE REPORT

A 21 year old young adult male was found in a hanging condition by a nylon rope, from the wooden beam of the ceiling of his own room which was bolted from inside, at about 03:00 pm of last June. In a very unusual gesture, a leather belt in the front side tied both wrists of the deceased. Left wrist was tied in multiple knots and right wrist was just held loosely in a loop. As the deceased was reported to be inside his room for unusual long hours, the neighbours informed the police who forced entry into the room after breaking the door. By the time the public started creating commotion on the unusual gesture of the dead and straight way concluded it to be a homicidal hanging. A thorough crime scene investigation was done and the body was sent for autopsy.

### CRIME SCENE INVESTIGATION

The room was mud walled with CGI sheet roofing. The room had two doors which were locked from inside with no other point of entry. The police forced the main entrance

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door open in presence of several witnesses. The deceased was found hanging by a plastic rope from the wooden beam under the ceiling. The body was above the bed and the feet was touching the bed, one wooden tool inversely placed on the bed. The distance between suspension point to bed was 8 ft 2 inches, suspension point to knot at the neck was 2ft 2 inches (approx.), height of wooden tool was 1ft 5 inches, length of body was 5ft 9 inches (after elongation), distance between bed to floor was 1ft 6 inches. The findings are suggestive that the deceased easily achieved the suspension point. The knot was positioned centrally at back. There was protrusion of tongue with reddish stains, dribbling of saliva from mouth at the opposite end of the knot, nasal discharge. The trouser was found wet likely due to discharge of urine (**Figure 1**).

The hand of the deceased was observed to be loosely knotted at the front with black coloured waist belt. The gaps between the two hands were 2.6 inches. There were some cobwebs adhered on dorsum of both the hands, supposedly, from the ceiling/beam while fixing knots, etc., (**Figure 2**).



**Figure 1** Crime scene picture

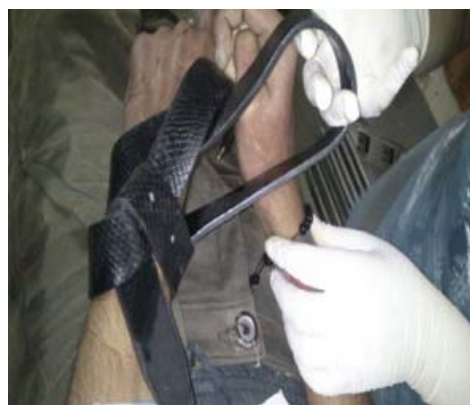
#### AUTOPSY FINDINGS

The deceased was a young adult male 21 years of age, average built and height. On external examination, wearing apparels were one brown coloured vest with red coloured shoulder straps and a khaki green coloured full pant. A

leather belt on the anterior aspect of the body tied both his wrists. The right wrist was tied in a single loop and his left wrist was tied in a double loop without any knot which can be separated easily (**Figure 2**). There were no injuries present underneath the knot (**Figure 3**). The ligature mark, brownish in colour, grooved, non-continuous, and hard like parchment and having a maximum width of 03 cm was present obliquely and incompletely around the neck. The mark was situated 2.8cm below the tip of right mastoid process, 05 cm below the chin, 10 cm above the suprasternal notch and 04 cm below the tip of left mastoid process. On dissection of the neck, the underlying subcutaneous tissue was found pale and glistening with no extravasation of blood and with intact cartilages (**Figure 4**).

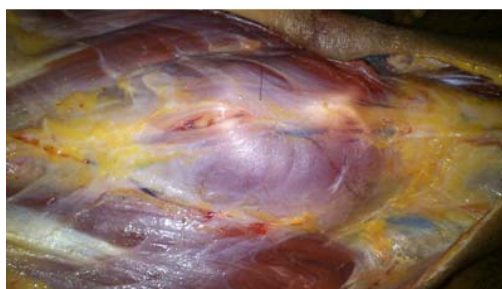


**Figure 2** Loosely tied wrists with leather belt and cobwebs sticking on the palm



**Figure 3** Showing wrists tied loosely in simple loop with no underlying injuries





**Figure 4** Picture of underlying neck structure in autopsy showing no extravasations

## DISCUSSION

From the crime scene investigation report and autopsy report, the case was concluded to be an unusual case of a typical partial hanging which was suicidal in nature and the investigating officer was directed accordingly. Gorniak et al in 2005 reported three such cases of suicide by hanging with bound hands in Franklin County, Ohio within a period of 4 months where initially police termed the case to be of “suspicious in nature” because of the unusual presentation.<sup>2</sup> F A Benomran in his study on “Masking and bondage in suicidal hanging” described a man of 35 years found in hanging condition in an isolated place with hands loosely tied and vest wrapped around his head and upper part of neck. Though initially it was suspected to be a case of autoerotic asphyxia, however after thorough crime scene investigation and autopsy it was concluded to be suicidal in nature.<sup>3</sup> U.K.D.A. Goonetilleke, in his study also described of two such cases of unusual suicide, where in the first case the deceased’s left hand tied to the left thigh with the head and face covered by a heavy winter coat. In the second case the deceased’s hands were tied behind his back.<sup>4</sup> Marsh et al and Takac S in their similar case reports depicted unusual suicidal hanging with hands tied at the back and mouth gagged.<sup>5, 6</sup> Demirci et al in his study conducted at Konya province, Turkey from 2002 to 2006, reported 17 such similar cases of unusual suicidal hanging. According to the author, these are all precautions and preventive measures observed by the victim to avoid abandoning the act.<sup>7</sup> Venneman and Emson reported a case of accidental autoerotic asphyxia.<sup>8, 9</sup> However, in our present case report no such circumstantial evidence of auto erotic acts was reported. Cliver Trevor Cooke, Gerard Andrew Cadden and Karin Ann Margolius in their study conducted in Western Australia, however, reported a very high incidence suicidal hanging in males of age group 15 to 35 years.<sup>10</sup>

## CONCLUSION

Unusual cases of suicide are dilemma to the judiciary system and maximum time considered death under “suspicious nature”. However these are nothing but precautions and preventions taken by the victim to avoid abandoning the act. But the possibility of autoerotic asphyxia and homicidal hanging also has to be borne in mind and accordingly has to be ruled out. A meticulous crime scene investigation and autopsy, together with inquiry data helps in solving such dilemma.

**Acknowledgement:** The authors are thankful to the Director, SFSL and Head of Department of Forensic Medicine, AGMC, Tripura for their kind support and encouragement in taking up the study.

**Consent:** Informed consent was taken from the parent.

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CASE ARTICLE

## Ruptured Tubal Pregnancy in a Case of Bicornuate Uterus-an Atypical Case Report

**Choudhury Pranab<sup>1</sup>, Nath Anamika<sup>2</sup>, Das Prasenjit<sup>3</sup>**

*Received on July 11, 2015; Accepted (revised) on July 17, 2015*

### ABSTRACT

*Ectopic pregnancies may occur as high as 1 in 300 to 1 in 150 deliveries and result in high mortality and morbidity. 1% of general population have uterine abnormalities, most of them resulting from abnormal fusion of mesonephric or mullerian duct like unicornuate, bicornuate and septate uterus. In this case a woman married for last 11 years with history of 03 spontaneous abortions and 01 living issue was referred from a rural hospital with acute abdomen, nausea and reeling of head but succumbed on the way and was sent for autopsy. On dissection, ruptured tubal pregnancy with bicornuate uterus was discovered. Any woman having acute abdomen in reproductive age group must be investigated for ectopic pregnancy to reduce morbidity and mortality. Ultrasonography must be done for each pregnant lady as early as possible to rule out ectopic pregnancy and congenital anomalies which may possess threat to the mother and the baby.*

**Keywords:** *Ectopic pregnancy, uterine anomalies, mesonephric duct, bicornuate uterus*

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### INTRODUCTION

During organogenesis in embryonic life, abnormal fusion of the mullerian duct results in various malformations of the uterus.<sup>1</sup>The most common mullerian anomalies are septate uterus, unicornuate uterus, bicornuate uterus and uterus didelphys.<sup>2</sup> Incidence of having 0.16 to 10 % of uterine malformations have been reported, overall 1% in general population and 3% in women having poor pregnancy outcomes.<sup>3,4</sup> Some of these anomalies are asymptomatic and incidental findings on ultrasonography and hysterosalpingography done for investigation of infertility.<sup>5</sup>Bicornuate uterus is one of the congenital anomalies arising from abnormal fusion of the mullerian duct resulting in problems of fertility and birth.<sup>6</sup> Abortions, decreased foetal growth, malpresentations during birth and ectopic pregnancies are common findings with bicornuate uterus.

### CASE REPORT

A 30 year old lady, from a rural village, married for 11 years having 01 living issue, with alleged history of acute abdomen, nausea, reeling of head for 1 day and amenorrhoea for last 02 months was referred from a primary health centre to AGMC and GB Pant Hospital. There was no history of vaginal bleeding. She had three spontaneous abortions previously during her first trimesters and delivered a girl child 4 and 1/2 years back by lower segment caesarian section at a sub-divisional hospital. On arrival, she was declared dead by the attending emergency medical officer and was sent to the mortuary wing for post mortem examination.

On external examination her built was average. She was pale. Rigor mortis was present all over the body in a well developed stage and post mortem staining was present at the back of the trunk, thighs and legs and fixed, except the areas of contact flattening. Montgomery tubercles were present on both breasts. Lower abdomen was slightly distended. Thick curdy white discharge was present in and around the vulva. On dissection of the abdominal cavity, 03 litres of liquid and clotted blood was present in the peritoneal cavity. Uterus measured 14cmsx10cmsx4cms and had two cornus. Ampulla of the right fallopian tube was ruptured and the rupture site was 5cms from the origin of the tube (**Figure 1**) which bore a foetus of length 4 cms. On dissection of the uterus, two cornus were distinctly visualised (**Figure 2**). No other abnormality was present in the adnexal structures. All other organs were pale.

The cause of death in this case was shock and haemorrhage resulting from ruptured tubal pregnancy in a case of bicornuate uterus.



**Figure 1** Ruptured Tubal pregnancy at the ampullary site of right ovary



**Figure 2** Bicornuate uterus and ruptured tubal pregnancy

## DISCUSSION

An ectopic pregnancy is one in which the fertilized ovum is implanted and develops outside the normal uterine cavity. It was first discovered by Busiere in 1663 in France and thereafter Gifford made a complete report in 1731.<sup>7</sup> The incidence varies from 1 in 300 to 1 in 150 deliveries.<sup>8</sup> Most commonest site is the ampulla of the fallopian tube constituting nearly 55% of all ectopic pregnancies.<sup>8</sup> Rupture of the tubes are predominantly common in isthmus implantation and occurs at 6-8 weeks, followed by ampullary pregnancies at 8-12 weeks. It is seen that, if the implantation occurs in the antemesenteric border in the ampulla, the pregnancy might continue a little longer. The classical triad of symptoms-amenorrhoea, abdominal pain and vaginal bleeding occurs in 30-40% of cases. The pain is acute, agonising and colicky and occurs due to distention of tube by blood and due to colic of the tubal muscles. Syncopal attack occurring in 10% women carrying ectopic pregnancies is due to reflex vasomotor disturbances caused by irritation of the peritoneum by blood. Abnormal fusion of the mesonephric duct or the mullerian duct leads to uterine anomalies like septate uterus, unicornuate uterus and bicornuate uterus.<sup>8</sup> According to The American Fertility society mullerian duct anomalies are classified into four classes.<sup>9</sup> Bicornuate uterus falls into class IV of the classification. Further it has been classified into three subtypes which are complete, partial and arcuate types. Women having bicornuate uterus have 62.5% chance of having live birth and 25% chance of preterm delivery and abortion.<sup>10</sup> In this case the deceased lady had bad obstetric history with 03 abortions and 01 caesarean section. As the lady had bicornuate uterus hence the space for the gestational sac and foetus was less to grow inside, which prevented the migration of the fertilised ovum into the uterine cavity in this pregnancy, leading to ectopic pregnancy and finally rupture. She was unaware of her present pregnancy and was referred as a case of acute abdomen from a rural hospital without urine pregnancy test. Suspicion about ectopic pregnancy in women of reproductive age group having acute abdomen can save many lives.

## CONCLUSION

Ectopic pregnancy possesses a great threat to the well being of pregnant women. Rupture following ectopic pregnancy contributes significantly to maternal mortality and morbidity. Uterine anomalies like bicornuate uterus



can further accentuate incidence of ectopic pregnancy. Early detection can be useful in saving lives and reduction of morbidity and complications following ruptured ectopic and its surgical intervention. Ultrasound is definitely the tool of choice in detection at the earliest and should be made available at primary care unit. Clinical suspicion about ectopic pregnancy should be there in cases of women in reproductive age group having acute abdomen. ASHA and Anganwadi workers should be made aware of it so that they can further generate awareness amongst the common mass.

**Contribution of authors:** We declare that this work was done by authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

**Conflict of interest:** None.

**Declaration:** This article has not been submitted anywhere else for publication.

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## Academic Excellence of International Advisor of IJHRMLP

**Prof. Pabitra Kumar Gogoi** DCP MD DIPHEA RPMS (London University), a national advisor of IJHRMLP and Immediate Past President of the Indian Society of Haematology & Blood Transfusion leaving for Philippine Society of Paediatric Oncology, as an International Speaker to their Congress from November 5-6, 2015. Prof. Gogoi, who was the former Professor & Head, Department of Clinical Haematologist of Oxford University, Cambridge University & Royal Postgraduate Medical School, London University has been invited to speak on “The Role of L-asparaginase in Actue Lymphoblastic Leukaemia” in their Lunch Symposium.





CASE ARTICLE

## Phthisis Bulbi Due to Ocular Trauma: A Single Case Report

**Devi Bharati<sup>1</sup>**

*Received on October 5, 2015; accepted (revised) on October 30, 2015*

### ABSTRACT

*A phthisis bulbi is a small, shrunken, non-functional eye. The affected eye may have partial vision retained in some cases; though blindness with this disorder is very common. In phthisis bulbi, the eye has a scary and shrunken appearance. Phthisis bulbi occurs as a result of trauma (commonly in case of perforating wound), accident, exposure to the radiation, tumour, eye infection or inflammation. The severity of the disorder depends upon the type and depth of injury. Scleral perforation is a very serious condition of ocular injury which leads to phthisis bulbi within a few hours. The damage to structures within the eye from any of the above mentioned causes can eventually lead to eye atrophy i.e. shrinking. In this case report a young man came with a perforating eye injury caused by a sharpened bamboo stick with lacerations around his right eye. Due to severe inflammation the ocular adnexa like sclera, cornea, conjunctiva, iris, ciliary body etc got necrosed. Eyeball became shrunken and soft with loss of vision.*

**Keywords:** *Phthisis bulbi, perforating wound, vision, blindness*

### INTRODUCTION

The eye is the organ through which an organism acquires knowledge of its surrounding environment by virtue of light reflected from or emitted by the objects within the environment. It is the photoreceptor organ which with other types of receptors allows the organism to react and understand the world around it. The human visual apparatus includes the eyeball or globe and ancillary structures such as lids and the muscles that control the eye movement. The eye is protected from mechanical injury by being enclosed in a socket, or orbit which is made up of several bones of the skull to form a four sided pyramid. Though the bony orbit provides excellent protection for the eye from blunt injury, yet the protection is not adequate. Perforating injury from glass, sharp metal fragments etc are always serious.<sup>1</sup> The injury may involve lids, lacrimal apparatus, bony orbit, the adjacent structures, the eye ball and the visual pathway. The visual loss is pronounced in penetrating injuries of the eye. The cornea bears the main brunt and lacerations of this result in iris prolapse, endophthalmitis and even phthisis bulbi. Lens changes, retinal detachment, macular and optic nerve damage are more common with blunt injury.<sup>2</sup> *Phthisis bulbi* implies, in clinical terminology, a shrunken globe, usually from ceased aqueous humor formation (phthisis meaning “wasting away”). The intraocular pressure approaches 0 mm Hg. As a consequence, the cornea becomes distorted and can develop edema and scarring, and the lens develops cataracts. Both seem to occur due to the lack of nutrition by the aqueous. In addition, edema can develop in the macula and the optic nerve head and vision suffers accordingly. Finally, cyclitic membranes and proliferative vitreal retinopathy can

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develop, resulting in total retinal detachment and scar formation. The cause of phthisis is often uveitis, either long-term or following trauma, surgery, or end-stage, heavily treated glaucoma.<sup>3</sup>

### CASE REPORT

A twenty-three year old agricultural worker from rural area came to an eye O.P.D. with a history of perforating injury to the right eye by a sharpened bamboo stick stabbed by a neighbourhood person due to some quarrel between them. He was brought by his relative to the O.P.D. 6-7 hours after the injury.



**Figure 1** Picture showing hyphaema with scleral perforation

On examination lacerated wounds were seen around his right eye. His cornea became sluggish with little perforation. Hyphaema was seen in the anterior chamber, iris became inflamed but difficult to examine due to hyphaema, scleral perforation was seen, eye lid was also lacerated, intra-ocular pressure became lower than normal but it was difficult to examine properly due to the very painful condition. Immediately after routine examination the patient was taken to the eye O.T for repair of the wounds. Then the patient was admitted in the eye ward with full treatment like injectable antibiotic, anti-inflammatory drugs, vitamins, minerals etc. He was examined regularly after the operation. The vision of his injured eye gradually came down to P.L (Perception of light) -negative. The vision of the left eye was normal-6/6. After 10 days, his eye became soft and shrunken with grayish appearance and it developed to phthisis bulbi of the right eye.

### PATHO-PHYSIOLOGY

The physiological function of the ocular adnexa as well as the intra orbital structure is always affected by trauma. The physiological alteration is determined by the severity of trauma and to restore the anatomical and physiological function of the ocular structure is the main aim of management of all cases of ocular injuries. Approximately 66% of the penetrating eye injuries are through the cornea, 10% are through sclera and the remainder through the limbal area. Small puncture or linear laceration may be self sealing and large compound laceration may be leaking with incarceration of tissues. Post traumatic uveitis may occur due to retention of foreign bodies, incarceration of uveal tissues, irritation by lens matter, haemorrhage and shallow anterior chamber. It may give rise to secondary glaucoma, plastic iridocyclitis, and shrinkage of the globe leading to phthisis bulbi and blind eye.

### DISCUSSION

Despite anatomical and physiological natural protection afforded to the eye, injuries of the eye leading to blindness of various degrees ranging from little deterioration of vision to permanent blindness are quite common.<sup>4</sup> The extent of injuries depends on the nature of trauma, extent of damage to the intraocular structures, presence of intraocular foreign bodies and the site of injury.<sup>5</sup> Grin et al categorized various types of injuries into four groups – extra ocular, ocular, intra ocular and orbital fracture. Ocular injuries made up the majority of injuries (82%) which included both perforating (34.5%) and non-perforating (50%) injuries.<sup>6</sup> Moreira et al found that most common injuries were chemical and thermal burns (24%) followed by corneal abrasion (21.9%), perforation of the globe (6.2%), subconjunctival hemorrhage (4.8%) and hyphaema (4.8%), iridodialysis accounted for 0.7%. They also found superficial corneal foreign body 3.4%, corneal delamination 1.4%, lid echymosis 3.1%, traumatic cataract 0.7%, intra ocular foreign body 0.7%. After a minimum follow up of 4 months they found that out of 38 severely injured eyes 8 (21.05%) developed traumatic cataract and 5 (13.16%) developed phthisis bulbi.<sup>7</sup> Rapoport et al found in their study that out of 1127 injured eyes, the reason for severe visual outcome were 2% due to phthisis bulbi.<sup>8</sup> Sharma et al in his study on penetrating ocular injuries found that visual acuity was severely impaired in majority of the eyes and 2% of the eyes developed phthisis bulbi.<sup>9</sup> According to Coskun M et al, after penetrating eye injuries, visual prognosis and development of phthisis

bulbi are affected significantly by the factors including anatomic localization, size of the injury, associated anterior or posterior segment pathologies, and endophthalmitis secondary to the trauma.<sup>10</sup>

## CONCLUSION

Ocular injuries may occur in all age groups but complications are more common in children and illiterate population due to lack of awareness which may lead to permanent blindness. In this case report, the patient was a young adult who sustained injury due to violence. He came for medical consultation with an ophthalmologist after 6–7 hours due to which the ocular tissues got infected leading to development of endophthalmitis and finally to phthisis bulbi. Early consultation with an eye specialist enhance the possibility of controlling the ocular morbidity. Visual impairment following ocular injury is a complex multistructural involvement which requires specialized ophthalmic training to develop the excellence for corrective and reparative ocular surgeries.

**Conflict of interest:** None

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(27<sup>th</sup> & 28<sup>th</sup> April, 2015)

Organized by : Dept. of Pharmacology in collaboration with Dept. of Community Medicine and Forensic Medicine, Tezpur Medical College, Tezpur, Assam, India



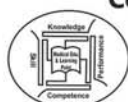
Members of the Organizing Committee of Workshop On Research Methodology Organized by Dept. of Pharmacology in collaboration with Dept. of Community Medicine and Forensic Medicine on 27<sup>th</sup> & 28<sup>th</sup> April, 2015, Tezpur Medical College, Tezpur, Assam. Dr Bhaskar Jyoti Dutta founder member of IJHRMLP coordinated the event

## IA & QMS Training Programme (4 Days)

Conducted by: Medical Education & Learning Point (Regd.)

Venue: Assam Medical College, Dibrugarh

**5th-8th August, 2015**



Group photograph of the delegates of IA & QMS Training Programme conducted by Medical Education & Learning Point in Assam Medical College, Dibrugarh on 5th -8th August, 2015. Dr. Keshab Bora, Founder Member of IJHRMLP co-ordinated the event



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